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D/26/VIII(C)

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13 MAY 2003

BRITISH INTELLIGENCE SURVEY

EGYPT

PART VIII (C): MILITARY ENGINEERING RESOURCES

BOX 4 DEFE 60/52

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This report supersedes the sections on Electricity, Water Supply and Construction Materials given in Sections VI, IX and XII of the General Report on Egypt, No. J.I.2/194 dated October 1957.

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C.B. No 1. April 65.
C.B. No 2 June 66
C.B. No. 3 Jan. 68
CB No 4 Mar. 69
CB 5 Mar. 70
Notice Nov 71

JOINT INTELLIGENCE BUREAU
MINISTRY OF DEFENCE
LONDON
OCTOBER 1963

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D. Mil. Survey
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NOTICE

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EGYPT

D/26/VIII(C)

PART VIII(C) - MILITARY ENGINEERING RESOURCES

OCTOBER 1963

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NOVEMBER 1971

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MINISTRY OF DEFENCE, LONDON

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CHECK BULLETIN

No. 5 Date: MARCH 1970

TO BE RETAINED WITH: (Title) BIS. EGYPT. PART VIII(C). MILITARY ENGINEERING RESOURCES

(Ref. No.) D/26/VIII(C) (Dated) OCTOBER 1963

LAST AMENDMENT: (No.) (Date)

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General Note

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LOCAL ENGINEER SUPPORT

Page 8
Para 8

Civil Engineering and Construction Industries

The larger civil engineering and construction companies are listed below; all are government - controlled by the Ministry of Housing and Utilities. All companies are based on Cairo.

Misr Concrete Development Co.
General Construction Co.
El Nasr Building and Construction Co.
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Misr Dredging and General Enterprises
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El Nasr Civil Engineering Co.
Egyptian Civil Engineering Co.
Nile General Bridge Co.
El Nasr General Construction
Industrial and Engineering Enterprises
El Nasr Public Utilities Co.
Arab Foundations Co.

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Defence Intelligence Staff, Ministry of Defence, London

Egyptian Contracting Co. (Moukhtar Ibrahim)
Arab Water and Drainage Co.
El Nasr Mechanical and Electrical Enterprises
General Civil Contracting Co.

ENGINEER RESOURCES

Page 9
Para 14

Plywood and Hardboard

Hardboard is manufactured at Damietta and particle board at El Mansura. The industry is being expanded.

Page 9
Para 16
and
Page 23
Appendix B

Cement

a. The capacity of the Torah Portland Cement Co works at Tura has been increased by 400,000 tons a year.

b. The present capacity of the Helwan Portland Cement Co factory at Helwan is 900,000 tons per annum. New plant is being installed so that an additional 400,000 tons a year may be produced.

c. The National Portland Cement Co plant at El Tabbin is being expanded to produce an additional 250,000 tons a year.

d. The Alexandria Portland Cement Co works near Alexandria has been enlarged and total capacity is now 300,000 tons per annum.

**e. Production of all types of cement is over 2 million tons per annum. Further manufacturing capacity is planned.

Page 9
Para 17

Cement Products

Asbestos-cement sheets, piping and fittings, pre-cast concrete pipes and fittings, and transmission standards are made by the Egyptian Cement Pipes and Products Co. in two Cairo factories and one factory at Alexandria.

Page 10
Paras 20 & 21

Iron and Steel

Products manufactured by the four steelworks, iron foundries and pipe-works are given below:

a. Delta Steelworks near Cairo

I. Rolling mill - 50,000 tons per annum of rounds from 8 mm to 30 mm. All from re-melted scrap. There is also an extrusion plant for wire.

II. Foundry - Centrifugally cast pipes up to 150 mm dia. Jobbing castings.

**b. National Metal Industries. Abu Za'bal
This plant has been badly damaged by bombing and is believed to be out of production completely.

c. Egyptian Copper Works. Alexandria

60,000 tons per annum of 8 mm to 28 mm rounds. All from re-melted scrap. Small quantities of wire are also extruded.

**d. Egyptian Iron and Steel Co., Helwan

The only integrated plant producing iron and steel from local ores. Following are produced at present -

Structural sections	Plate
Rail sections	Sheet and strip
Rounds 8mm to 25mm	Wire
Corrugated iron	Pipe
Steel castings and forgings	

About 65 per cent of all steel produced in Egypt is manufactured by this works. The plant has recently been expanded to include mills to produce hot and cold rolled sheet and strip. Spirally welded pipe up to 40 ins diameter will also be produced.

e. El Nasr Pipe Co., Cairo

Steel pipe 6 ins to 24 ins (spirally welded)
Steel pipe ½ in to 4 ins, black and galvanised (longitudinally welded)
Malleable cast iron pipe fittings ½ in to 2 ins, black and galvanised.

Page 11
Para 24

Other Manufactured Engineering Stores
The following engineering stores are now manufactured locally:

Boilers and pressure vessels (small sizes)
Bolts, nuts, screws, rivets, nails
Centre lathes and drilling machines (small, simple types)
PVC pipe
Ropes and cordage
Rubber machine belting and hose
Springs (flat and spiral)
Steel wire rope.

Page 11
Para 25

Industrial Gases and Welding Materials
Oxygen and acetylene are also produced at Aswan and Port Said. Arc welding electrodes are now made locally.

Page 11
Para 28

Mechanical Plant
a. Large quantities of plant have been imported of recent years, principally for the Aswan Dam and other development projects.

b. Wheeled agricultural type tractors are assembled locally.

WATER SUPPLIES

Page 12
Para 36(c) and
Appendix C.
Serial 2

**Western Desert (Coastal Areas)
The coastal pipeline still extends from the El Nubariya canal source to Mersa Matruh. The pipeline is in poor condition and its capacity is believed to be only about 40,000 - 60,000 gallons per day, presumably because a reduced pressure has had to be imposed. A project to lay a new pipeline is expected to start shortly.

Page 14

SEWAGE DISPOSAL

Cairo and Alexandria
Short term measures to relieve the overloaded sewerage systems of the two cities are in hand. A committee has been formed to make recommendations on the future development of the Cairo system.

ELECTRIC POWER

Page 14
Para 45

General
**With recent additions installed capacity is now over 2,000 megawatts, not including the Aswan High Dam capacity, which by February 1970 amounted to an additional 1,750 megawatts.

Page 15
Para 47
to 50 incl.

Organisation
A Ministry of Electric Power has apparently now been formed and has amalgamated all authorities responsible for generation and transmission into one organisation and those responsible for distribution into another.

Page 16
Para 51

Power Stations
**The latest annual figure available for electricity output is for 1966, at 5,894 million kilowatt hours. Since then, to the end of 1969, the High Dam power station has produced 3,781 million kilowatt hours itself.

Page 17
Para 56

Transmission and Distribution
**Work on the survey and design for a single power grid for the country and the actual construction began in 1962, with the assistance of the USSR. The transmission lines and sub-stations from the High Dam site are now practically completed. The double circuit lines (see Map 'C') between Aswan and Cairo are operated at 500 kilovolts. The first line was in operation in November 1967, the second in 1969. However, due to design defects, they are being operated very much below their designed capacity. In Lower Egypt main networks will be operated at 220 and 66 kilovolts.

Page 18
Para 58 — Polish firms have been working on the building of 3 substations in the Cairo area.

Para 59 — East German firms have been working on the building of 3 substations in the Alexandria area.

Page 18
Para 60 — **The transmission line between Cairo and Suez should now be in operation but suffered damage in January 1970 by Israeli attack.

Para 61 — Four 66/11 kilovolts sub-stations were projected at Fayum, Marcuf, Baliana and the Pyramids.

Para 62 — Yugoslavia and West Germany were competing for the contract for 14 sub-stations in Upper Egypt.

Para 63 — Development

a. Cairo West. The new Cairo West steam turbine plant was in full operation in 1966 with a capacity of 240 megawatts.

b. Cairo South. The extension of 120 megawatts to the Cairo South power station was in operation in July 1965.

c. Wadi Natrum area. Yugoslavia has carried out work in the Wadi Natrun area, about 42 miles northwest of Cairo, which included the installation of a 2,500 kilowatt power plant.

Page 19
New para 65a — Other Development

Renewals and additions to generating plant are reported to have been carried out, or to be in progress at the following locations: the sugar factories at Armant, Edfu, Nag Hammadi and Kom Ombo, the Misr Rayon Co. (Kafr Ad Dawar) and at Fayid, Karmuz, Ismailia, Siouf, Talkha and Bahtim.

Para 66 — **The Aswan High Dam. The present situation is that probably ten out of the planned twelve High Dam turbo-alternators were in operation in February 1970. The dam face was being concreted and cement was being injected to reduce seepage. It is estimated that the dam has already contributed £E 175 million to the national income and has stored enough water to convert basin-irrigation areas to perennial irrigation and for supply to land reclaimed for agricultural expansion. Irrigation is, however, 1 million feddans behind schedule. An Israeli raid on 31st October 1968 seriously damaged the substation at Nag Hammadi and reduced the transmission of power from Aswan to Cairo to negligible proportions for at least two months. Repairs and replacement plant had not been completed by February 1970.

Para 67

Other Projects

a. Sub-para (b): The power station came into operation in April 1966.

b. Sub-para (c): The second station has been postponed to the 1970's.

**

c. Sub-para (e). Five new barrages are to be built on the Nile to generate electricity and provide protection from the scouring which will follow the completion of the High Dam. Priority is to be given to those to be built at Qena and at Silsileh (95 megawatts capacity). Czechoslovakia and a Franco-German consortium were competing for these projects. The other barrage locations are to be at Sohag, Minich and Beni Suef. It is estimated that the production of electric power from these projects will total half that of the High Dam. Work is planned to begin at Qena this year and all should be completed within 8 years.

**

d. New sub-para (f). Ismailia. A 2 x 100 megawatt thermal power station contract was won by Czechoslovakia and work was to have begun in 1966. In 1969, however, power supply in the town was very limited.

e. New sub-para (g). Sidi Barrani and Salum. It is reported that new and outwardly identical power stations have been built at these locations.

f. It is hoped to back the ambitious power programme with adequate technical and research facilities such as an extensive laboratory with high voltage equipment, a digital computer for planning distribution of loads on the grid and an analogue computer for research work.

Pages 20 and 21
Appendix A

Stone, Sand and Gravel

There are large quarries at or near the following places:

Serial 5. Beni Suef

Serial 10. El Ballah

Pages 24-26
Appendix C

Regional Fresh Water Supplies

Serial 5 - A comprehensive well drilling programme in the "New Valley" area, particularly in Dukhla and Kharga Oases is providing many additional sources yielding good supplies of artesian water.

Serial 13 - As a part of the Sinai reclamation project to provide water for settlements and irrigation from a point south of El Qantara to opposite Suez, six pipes (1.5 metres diameter x 305 metres long) have been laid under the Suez Canal at Ismailiya. The system normally carries Nile water, presumably from the Sweetwater Canal, for use in Sinai. The supply is of course cut off at present owing to the Arab - Israel dispute.

Page 27
Appendix D

Water Supplies - Main Towns

Serial 1. Alexandria - Additional purification plant has been ordered, presumably to increase the capacity of the system.

Serial 6. Cairo - Tenders for the equipment of a waterworks were recently issued. This may be for the extension of the Rod El Farug system.

**Serial 22.	Port Said	All these systems and the sweetwater canal that feeds them have been damaged in the Arab - Israel dispute. DIS (DI 32) should be consulted for current information if required.
**Serial 24.	Ismailiya	
**Serial 25.	Suez	

D Mil Survey C/o Survey Section

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BRITISH INTELLIGENCE SURVEYS (B. I. S.)
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No. 4 Date: MARCH 1969

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Arab Foundations Co.

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ENGINEER RESOURCES

Page 9
Para 14

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Hardboard is manufactured at Damietta and particle board at El Mansura. The industry is being expanded.

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b. National Metal Industries. Abu Za'bal

8 mm to 35 mm rounds. 6mm to 10mm wire. All from re-melted scrap. It is planned to develop and modernise the plant to produce 150,000 tons per annum.

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60,000 tons per annum of 8 mm to 28 mm rounds. All from re-melted scrap. Small quantities of wire are also extruded.

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- Structural sections
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- Steel castings and forgings
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- Sheet
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About 65 per cent of all steel produced in Egypt is manufactured by this works. The plant is currently being expanded including mills to produce hot and cold rolled sheet and strip. Spirally welded pipe up to 40 ins diameter will also be produced.

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The following engineering stores are now manufactured locally:

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Page 12
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ELECTRIC POWER

Page 14
Para 45

General

**Installed capacity in 1965 was 1,617 megawatts. With recent additions it is now probably about 2,000 megawatts, not including the Aswan High Dam capacity at present installed.

Page 15
Para 47 to 50 incl.

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Page 16
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Para 66

**The Aswan High Dam. The present situation is that probably five out of the planned twelve, High Dam turbo-alternators were in operation in November 1968, the dam had to be raised a further 20 feet and the whole structure covered in concrete. It is estimated that the dam has already saved more than £70 millions in damage by flooding and has stored enough water to convert basin-irrigation areas to perennial irrigation and for supply to land reclaimed for agricultural expansion, An Israeli raid, however, on 31st October 1968 seriously damaged the substation at Nag Hammadi and reduced the transmission of power from Aswan to Cairo to negligible proportions for at least two months.

Para 67

Other Projects

a. Sub-para (b): The power station came into operation in April 1966.

b. Sub-para (c): The second station has been postponed to the 1970's.

c. Sub-para (e). Seven new barrages are to be built on the Nile to provide protection from the scouring which will follow the completion of the High Dam. Priority is to be given to those to be built at Sohag (85 megawatts capacity) and at Silsileh (95 megawatts capacity). Czechoslovakia and a Franco-German consortium were competing for these projects. The other barrage locations are to be at Keft, Deirut, Samalut, Beba and El Kubbabat. It is estimated that the production of electric power from these projects will total half that of the High Dam.

d. New sub-para (f). Ismailia. A2 x 100 megawatt thermal power station contract was won by Czechoslovakia and work was to have begun in 1966.

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f. It is hoped to back the ambitious power programme with adequate technical and research facilities such as an extensive laboratory with high voltage equipment, a digital computer for planning distribution of loads on the grid and an analogue computer for research work.

Pages 20 and 21 Appendix A

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There are large quarries at or near the following places:

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Pages 24-26 Appendix C

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Page 27
Appendix D

Water Supplies - Main Towns

Serial 1. Alexandria - Additional purification plant has been ordered, presumably to increase the capacity of the system.

Serial 6. Cairo - Tenders for the equipment of a waterworks were recently issued. This may be for the extension of the Rod El Farug system.

Serial 22. Port Said - 8 new rapid gravity filters have been installed raising capacity to a total of 16.5 million gpd. Demand is 12.1 million gpd average and 14.3million gpd peak.

Serial 24. Ismailiya - Work has started on additional filtration plant so as to raise capacity of the town system to about 14 million gpd.

Serial 25. Suez - Water supply system has been extended and improved. Capacity is now about 10 million gpd.

These systems have been or are liable to be affected by the Arab-Israel dispute. DIS should be consulted for current information if required.

D. Mil.
Survey.

BRITISH INTELLIGENCE SURVEYS (B. I. S.)
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CHECK BULLETIN

No. 3 Date: JANUARY 1968

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c. The National Portland Cement Co plant at El Tabbin is being expanded to produce an additional 250,000 tons a year.

d. The Alexandria Portland Cement Co works near Alexandria has been enlarged and total capacity is now 300,000 tons per annum.

e. Production of all types of cement totalled 2.32 million tons in 1965.

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Reg. No. C496 Defence Intelligence Staff, Ministry of Defence, London

Page 9
paragraph 17

**Cement Products
A wide range of pre-cast concrete and asbestos-cement products is manufactured. Production has more than tripled in the last five or six years.

Page 10
paragraphs 20
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Products manufactured by the four steelworks, iron foundries and pipe-works are given below:-

a. Delta Steelworks near Cairo

(1) Rolling mill - 50,000 tons per annum of rounds from 8 mm to 30 mm. All from re-melted scrap. There is also an extrusion plant for wire.

(ii) Foundry - Centrifugally cast pipes up to 150 mm dia. Jobbing castings.

b. National Metal Industries. Abu Za'bal

8 mm to 35 mm rounds. 6 mm to 10 mm wire. All from re-melted scrap. It is planned to develop and modernise the plant to produce 150,000 tons per annum.

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60,000 tons per annum of 8 mm to 28 mm rounds. All from re-melted scrap. Small quantities of wire are also extruded.

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The only integrated plant producing iron and steel from local ores. Following are produced at present -

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Rail sections
Rounds 8mm to 25mm
Corrugated iron.
Steel castings and forgings
Plate
Sheet
Wire

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e. El Nasr Pipe Co. Cairo

Steel pipe 6 ins to 24 ins (spirally welded)
Steel pipe $\frac{1}{2}$ ins to 4 ins, black and galvanised (congitudinally welded)
Malleable cast iron pipe fittings $\frac{1}{2}$ ins to 2 ins, black and galvanised.

Page 11,
paragraph 24

Other Manufactured Engineering Stores

The following engineering stores are now manufactured locally:
Boilers and pressure vessels (small sizes)
Bolts, nuts, screws, rivets, nails
Centre lathes and drilling machines (small, simple types)
PVC pipe
Ropes and cordage
Rubber machine belting and hose
Springs (flat and spiral)
Steel wire rope.

Page 11, paragraph 25	Industrial Gases and Welding Materials Oxygen and acetylene are also produced at Aswan and Port Said. Arc welding electrodes are now made locally.
Page 11, paragraph 28	Mechanical Equipment a. Plant imported for the Aswan High Dam project includes 40 Aveling - Barford dump trucks (Rolls-Royce engines) and some large Ruston-Bucyrus excavators. b. An order for 92 pieces of Le Tourneau-Westinghouse plant including motor scrapers and dozers has been placed. **c. Wheeled agricultural type tractors are assembled locally.
Page 12, paragraph 34 after	WATER SUPPLIES Desalination of sea-water A combined electric power station/desalination plant, powered by a nuclear reactor may be erected at Borg El Arab, 55 km, west of Alexandria and 6 km from the sea. Tentative capacity is 150 MW/550,000 gallons per day. The project is still under preliminary study.
Page 12, paragraph 36(c) and Appendix C, Serial 2	**Western Desert (Coastal Areas) The coastal pipeline still extends from the El Nubariya canal source to Mersa Matruh. The pipeline is in poor condition and its capacity is believed to be only about 40,000 - 60,000 gallons per day, presumably because a reduced pressure has had to be imposed.
Page 14	SEWAGE DISPOSAL Cairo and Alexandria Short term measures to relieve the overloaded sewerage systems of the two cities are in hand. A committee has been formed to make recommendations on the future development of the Cairo system.
Page 14, paragraph 45	ELECTRIC POWER General **Installed capacity in 1965 was 1,617 megawatts.
Page 15, paragraph 47 to 50 incl	Organisation **A Ministry of Electric Power has apparently now been formed and has amalgamated all authorities responsible for generation and transmission into one organisation and those responsible for distribution into another.
Page 16, paragraph 51	Power Stations **The latest figures available for electricity output are 4,091 million kilowatt hours in 1962, 4,478 million in 1963 and 5,444 million in 1964.

Page 17, paragraph 56

Transmission and Distribution

**Work on the survey and design for a single power grid for the country and the actual construction began in 1962, with the assistance of the USSR. The transmission lines from the High Dam site are now being erected throughout Upper and Lower Egypt and 10 sub-stations were to be built by 1966. The double circuit lines (see Map 'C') between Aswan and Cairo are to be operated at 500 kilovolts. The first line was in operation in November 1967, the second is scheduled for completion in 1970. In Lower Egypt main networks will be operated at 220 and 66 kilovolts.

Page 18 paragraph 58 Polish firms were working on the building of 3 sub-stations in the Cairo area.

paragraph 59 East German firms were working on the building of 3 sub-stations in the Alexandria area.

paragraph 60 The pylons for a transmission line Cairo to Suez were well advanced by mid-1965 and the line should now be in operation.

paragraph 61 Four 66/11 kilovolts sub-stations were projected at Fayum, Marouf, Baliana and the Pyramids.

paragraph 62 Yugoslavia and West Germany were competing for the contract for 14 sub-stations in Upper Egypt.

paragraph 63

Development

**a. Cairo West. The new Cairo West steam turbine plant was in full operation in 1966 with a capacity of 240 megawatts.

**b. Cairo South. The extension of 120 megawatts to the Cairo South power station was in operation in July 1965.

c. Wadi Natrum area. Yugoslavia has carried out work in the Wadi Natrun area, about 42 miles northwest of Cairo, which included the installation of a 2,500 kilowatt power plant.

Page 19 new paragraph 65a

Other Development

**Renewals and additions to generating plant are reported to have been carried out, or to be in progress at the following locations: the sugar factories at Armant, Edfu, Nag Hammadi and Kom Obmo, the Misr Rayon Co. (Kafr Ad Dawar) and at Fayid, Karmuz, Ismailia, Siouf, Talkha and Bahtim.

paragraph 66 **The Aswan High Dam. The present situation is that two, possibly three, of the High Dam turbo-alternators were in operation in November 1967, and storage in Lake Nasser had reached 40,000 million cubic metres with a dam height of 170 metres and the main body 90% completed. It is estimated that the dam has already saved £70 millions in damage by flooding and has stored enough water to convert basin-irrigation areas to perennial irrigation and for supply to land reclaimed for agricultural expansion.

Page 19
paragraph 67

Other Projects

a. Sub-para (b): The power station came into operation in April 1966.

b. Sub-para (c): The second station has been postponed to the 1970's.

c. Sub-para (e). Seven new barrages are to be built on the Nile to provide protection from the scouring which will follow the completion of the High Dam. Priority is to be given to those to be built at Sohag (85 megawatts capacity) and at Silsileh (95 megawatts capacity). Czechoslovakia and a Franco-German consortium were competing for these projects. The other barrage locations are to be at Keft, Deirut, Samalut, Beba and El Kubbabat. It is estimated that the production of electric power from these projects will total half that of the High Dam.

d. New sub-para (f). Ismailia. A 2 x 100 megawatt thermal power station contract was won by Czechoslovakia and work was to have begun in 1966.

e. New sub-para (g). Sidi Barrani and Salum. It is reported that new and outwardly identical power stations have been built at these locations.

f. It is hoped to back the ambitious power programme with adequate technical and research facilities such as an extensive laboratory with high voltage equipment, a digital computer for planning distribution of loads on the grid and an analogue computer for research work.

Pages 20 and 21,
Appendix A

Stone, Sand and Gravel

There are large quarries at or near the following places:

Serial 5. Beni Suef

Serial 10. El Ballah

Pages 24-26,
Appendix C

Regional Fresh Water Supplies

Serial 5 - A comprehensive well drilling programme in the "New Valley" area, particularly in Dukhla and Kharga Oases is providing many additional sources yielding good supplies of artesian water.

Serial 13 - As a part of the Sinai reclamation project to provide water mainly for irrigation from a point south of El Qantara to opposite Suez, six pipes (1.5 metres diameter x 305 metres long) have been placed under the Suez Canal. This system will carry Nile water, presumably from the Sweetwater Canal, for use in Sinai (but see General Note at the head of this Check Bulletin).

Page 27
Appendix D

**Water Supplies - Main Towns

Serial 1. Alexandria - Additional purification plant has been ordered, presumably to increase the capacity of the system.

Serial 6. Cairo - Tenders for the equipment of a waterworks were recently issued. This may be for the extension of the Rod El Farug system.

Serial 22. Port Said - 8 new rapid gravity filters have been installed raising capacity to a total of 16.5 million gpd. Demand is 12.1 million gpd average and 14.3 million gpd peak.

Serial 24. Ismailiya - Work had started on additional filtration plant so as to raise capacity of the town system to about 14 million gpd.

Serial 25. Suez - Water supply system has been extended and improved. Capacity is now about 10 million gpd.

These systems have been or are liable to be affected by the Arab-Israel dispute. DIS should be consulted for current information if required.

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COPY NO. 256

BRITISH INTELLIGENCE SURVEYS (B. I. S.)
AND
PORT INFORMATION SHEETS (P. I. S.)

CHECK BULLETIN

No. 2 Date: 1 June 1966

TO BE RETAINED WITH: (Title) BIS EGYPT. Part VII(C) Military ENGINEERING RESOURCES
(Ref. No.) D/26/VIII(C) (Dated) Oct 1963
LAST AMENDMENT: (No.) – (Date) –

This bulletin shows the main changes which have occurred affecting the information contained in the B.I.S./P.I.S. (and any amendments thereto) referred to above. These changes will be incorporated in any future amendment to or re-issue of the B.I.S./P.I.S. Meanwhile this Bulletin is to be retained with the B.I.S./P.I.S. AND CONSULTED WHENEVER THIS IS USED. This Bulletin supersedes any previous one which should now be destroyed.
ITEMS ISSUED FOR THE FIRST TIME ARE MARKED WITH A DOUBLE ASTERISK.

ENGINEER RESOURCES

Page 9, paragraph 14

**Plywood and Hardboard

Hardboard is manufactured at Damietta and particle board at El Mansura.

Page 9, paragraph 16 and Page 23, Appendix B

**Cement

a. Capacity of the Helwan Portland Cement Co. factory at Helwan is 900,000 tons per annum. An additional 400,000 tons a year capacity is projected.

b. Capacity of the National Portland Cement Co. works at El Tabbin is now 674,000 tons per annum.

c. Capacity of the Alexandria Portland Cement Co. factory is now 300,000 tons a year capacity is projected.

Production of all types of cement totalled 2.26 million tons in 1964.

Page 9, paragraph 17

**Cement Products

Production of pre-cast concrete products is now about three times as much as in 1961

SURVEY
- 6 SEP 1966
D/26/VIII C

Defence Intelligence Staff, Ministry of Defence, London

D 38926/1/R.45 10m 6/65 TCL

CONFIDENTIAL

Page 10,
paragraph 21

Iron and Steel

a. The Helwan works of the Egyptian Iron and Steel Co. now manufactures corrugated iron.

**b. Steel pipes are now produced by horizontal seam welding and spiral welding processes by the El Nasr Pipe Co. of Cairo. Malleable iron pipe fittings are also made.

Page 11,
paragraph 24

**Other Manufactured Engineering Stores

The following engineering stores are now manufactured locally :

Boilers and pressure vessels (small sizes)
Bolts, nuts, screws, rivets, nails
Centre lathes and drilling machines (small, simple types)
P.V.C. pipe
Ropes and cordage
Rubber machine belting and hose
Springs (flat and spiral)
Steel wire rope.

Page 11,
paragraph 25

**Industrial Gases and Welding Materials

Oxygen and alctylene are also produced at Aswan and Port Said. Arc welding electrodes are now made locally.

Page 11,
paragraph 28

Mechanical Equipment

a. Plant imported for the Aswan High Dam project includes 40 Aveling - Barford dump trucks (Rolls-Royce engines) and some large Ruston-Bucyrus excavators.

b. An order for 92 pieces of Le Tourneau-Westinghouse plant including motor scrapers and dozers has been placed.

Page 12, after
paragraph 34

WATER SUPPLIES

Water Supplies - Desalination of sea-water

A combined electric power station/desalination plant, powered by a nuclear reactor is planned for erection at Borg El Arab, 55 km, west of Alexandria and 6 km from the sea. Tentative capacity is 150 MW/550,000 gallons per day. The project is still under preliminary study.

Page 14

SEWAGE DISPOSAL

**Cairo and Alexandria

Short term measures to relieve the overloaded sewerage systems of the two cities are in hand. A committee has been formed to make recommendations on the future development of the Cairo system.

Page 14, paragraph 45

ELECTRIC POWER

**General

The latest figures available for electricity output are 4,091 million kilowatt hours in 1962, 4,478 million in 1963.

Page 15, paragraph 46

Information included in the 1965 - 70 5-Year Plan slightly modifies information in this paragraph and has been included in the relevant text in this Check Bulletin.

Page 17, paragraph 56

**Transmission and Distribution

a. Work on the survey and design for a single power grid for the country and the organisation of its exploitation, began in 1962 with the assistance of the USSR. The transmission lines from the Aswan High Dam are now being erected throughout Upper and Lower Egypt and 10 transformer stations were to be built by 1966. The double circuit lines (see map 'C') between Aswan and Cairo are to be at 500 kilovolts.

b. Nearly 40% of the pylons for the first transmission line from Aswan to Cairo had been erected by the end of 1965 and work on this line is scheduled for completion in April 1967, ready to receive the first electricity to be generated by the first turbine set. The USSR is providing all equipment.

Page 18, paragraph 58

Polish firms are working on the building of 3 sub-stations in the Cairo area.

paragraph 59

East German firms are working on the building of 3 sub-stations in the Alexandria area.

paragraph 60

**The pylons for a transmission line between Cairo and Suez were well advanced by mid-1965.

paragraph 61

Four 60/11 kilovolt sub-stations are to be built at Fayum, Marouf, Baliana and the Pyramids.

paragraph 62

Yugoslavia and West Germny are competing for the building of 14 sub-stations in Upper Egypt.

paragraph 63

Development

**The first set of the new Cairo West station (3 x 80 megawatt sets) began operation in mid-1965 and the plant was expected to be in full operation later in 1965. Yugoslavia has carried out a programme of work in the Wadi Natrun area (100 km northwest of Cairo which included the installation of a 2,500 kilowatt power plant.

Page 18, paragraph 64

a. The projected nuclear power station is being regarded mainly as a training and experimental project and its power output is not being included in calculations for power production in the country.

b. The USSR has a contract for a 2 x 100 megawatt power station at Mex, to be started in 1966.

c. Switzerland has a contract for a 2 x 14 megawatt power station using gas turbine plant, on the outskirts of the city, for completion in 1966.

paragraph 65

The conversion of the design of this project to that of a partial pumped storage scheme has created more favourable reaction to its implementation. It is hoped that a 600 megawatt capacity project will be started in 1967/68 for completion in 1975.

Page 19, paragraph 66

**a. Work on the High Dam is on schedule. All tunnels were expected to be ready by May 1966, in good time to receive the summer flood.

b. Installation of the generating sets is phased as follows:

- a. Sets 1 and 2 - late 1966.
- b. Sets 3, 4 and 5 - late 1967.
- c. Sets 6, 7 and 9 - late 1968.
- d. Sets 10 and 12 - late 1969.

paragraph 67

a. Sub para (c). The second station has been postponed to the 1970's.

**b. Sub para (e). Seven new barrages are to be built on the Nile to provide protection from the scouring which will follow the completion of the High Dam. Priority is given to those to be built at Sohag (85 megawatts power capacity, for completion by 1969) and at Silsileh (95 megawatts power capacity, for completion by 1970). Czechoslovakia and a Franco-German consortium are competing for these projects. The other barrage locations are to be at Keft, Deirut, Samalut, Beba and El Kubbabat. The production of electric power from these projects is estimated to total half that of the High Dam.

c. New sub para (f). Ismailia. Czechoslovakia has a contract for a 2 x 100 megawatt thermal power station, work on which is to begin in 1966.

d. New sub para (g). It is hoped to back the ambitious power programme with adequate technical and research facilities such as an extensive laboratory with high voltage equipment, a digital computor for planning distribution of loads on the grid and an analogue computor for research work.

**e. Two new power stations, which appear identical but of which no details are known, have been built at Sidi Barrani and Salum.

Pages 20 and 21, Appendix A

**Stone, Sand and Gravel

There are large quarries at or near the following places :

Serial 5. Beni Suef

Serial 10. El Ballah

Pages 24-26, Appendix C

Regional Fresh Water Supplies

Serial 5 - A comprehensive well drilling programme in the "New Valley" area, particularly in Dukhla and Kharga Oases is providing many additional sources yielding good supplies of artesian water.

**Serial 13 - As a part of the Sinai reclamation project to provide water mainly for irrigation from a point south of El Qantara to opposite Suez, six pipes (1.5 metres diameter x 305 metres long) have been placed under the Suez Canal. This system will carry Nile water, presumably from the Sweetwater Canal, for use in Sinai.

Pages 31-34, Appendix D, Part II

**Water Supplies - Suez Canal Area

Serial 22, Port Said - 8 new rapid gravity filters installed, raising capacity to a total of 16.5 million gallons per day (g.p.d.). Demand is 12.1 million g.p.d. average and 14.3 million g.p.d at peak.

Serial 24, Ismailia - Work has started on additional filtration plant so that total capacity of the town supply system will be about 14 million g.p.d.

Serial 25, Suez - Water supply system has been extended and improved. Capacity is now about 10 million g.p.d.

Page 36, Appendix E

Principal Electric Power Stations of the Nile Delta

a. Serial No. 4, Cairo South, column (k). The extension was completed in July 1965.

b. New Serial No. 4a, column (a) - Cairo West, column (b) - 240, column (k) - first set in operation mid-a965, expected to be in full operation later in 1965.

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BRITISH INTELLIGENCE SURVEYS (B. I. S.)
AND
PORT INFORMATION SHEETS (P. I. S.)

CHECK BULLETIN

No. 1 Date: 1 April 1965

TO BE RETAINED WITH: (Title) B.I.S. EGYPT PART VIII (C)

(Ref. No.) D/26/VIII(c) (Dated) October 1963

LAST AMENDMENT: (No.) - (Date) -

This bulletin shows the main changes which have occurred affecting the information contained in the B.I.S./P.I.S. (and any amendments thereto) referred to above. These changes will be incorporated in any future amendment to or re-issue of the B.I.S./P.I.S. Meanwhile this Bulletin is to be retained with the B.I.S./P.I.S. AND CONSULTED WHENEVER THIS IS USED. This Bulletin supersedes any previous one which should now be destroyed. ITEMS ISSUED FOR THE FIRST TIME ARE MARKED WITH A DOUBLE ASTERISK.

ENGINEER RESOURCES

Page 9, para 16 and page 23, Appendix B.	**Cement (a) The Alexandria Portland Cement Co factory at Mex, Alexandria, has been extended and its capacity considerably increased. It is planned to extend the plant still further. (b) Additional plant has been ordered for the National Portland Cement Co factory at El Tabbin to increase capacity by about 250,000 tons per annum. (c) It is planned to extend the Torah Portland Cement Co works at Tura.
Page 10, para 20	**Iron and Steel The Helwan works of the Egyptian Iron and Steel Co now manufactures corrugated iron.
Page 11, para 28	**Mechanical Equipment (a) Plant imported for the Aswan High Dam project includes 40 Aveling - Barford dump trucks (Rolls-Royce engines) and some large Ruston-Bucyrus excavators. (b) A large order for Le Tourneau-Westinghouse plant including motor scrapers and dozers has been placed.

DIRECTORATE OF MILITARY SURVEY, SURVEY 3
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WATER SUPPLIES

Page 12, new para 34A

**Add new para:-

"34A. Desalination - A combined electric power station/desalination plant powered by a nuclear reactor is planned for erection at Borg El Arab, 55 km west of Alexandria and 6 km from the sea. Tentative capacity is 150 MW/550,000 gallons per day. The project is still under preliminary study."

ELECTRIC POWER

Page 14, para 45

**Add at end of para. "Electricity output rose from 2,125mm kilowatt hours in 1959 to 4,091 mm in 1962."

Page 15 para 46

**Information has become available on the 1965-70 5-Year Plan which slightly modifies or brings up-to-date information in this para in relation to

a. New Nile barrage hydro-electric plants,
b. the Qattara Depression project and
c. nuclear power
The information on these points is included in the succeeding items.

Page 17 para 56

**Work on the survey and design for a single power grid for the country and the organisation of its exploitation, began in 1962 with the assistance of the USSR. The transmission lines of the Aswan High Dam are now being erected throughout upper and Lower Egypt and 10 transformer stations are to be built by 1966. The double circuit lines (see map 'C') between Aswan and Cairo are to be at 500 kilovolts.

Page 18 para 58

**Add at end of para. "Polish firms are working on the building of 3 sub-stations in the Cairo area."

Para 59

**Add at end of para. "East German firms are working on the building of 3 sub-stations in the Alexandria area."

Para 61

**Add at end of para "Four 60/11 kilovolt sub-stations, not yet contracted for, are to be built at Fayum, Marouf, Baliana and the Pyramids."

Para 62

**Add at end of para. "Yugoslavia and West Germany are competing for the building of 14 sub-stations in Upper Egypt."

Para 63

**a. Line 5 "261 megawatt" to read "3x87.5 megawatt sets with the possibility of a fourth set for completion during 1966 of a".
b. Line 7/8. Delete "and is scheduled to go into service in 1964".
c. Yugoslavia has carried out a programme of work in the Wadi Natrun area (100km NW of Cairo) which included well drilling, irrigation works and the installation of a 2,500 kilowatt power plant.

Para 64

**a. The projected nuclear power station is being regarded mainly as a training and experimental project and its power output is not being included in calculations for power production in the country.
b. The USSR has a contract for a 2x100 megawatt station at Mex, to be started in 1966.
c. Switzerland has a contract for 2x14 megawatt gas turbine sets on the outskirts of the city for completion in 1966.

Para 65

**Add at end of para. "The conversion of the design of this project to a partial pumped storage scheme has created more favourable reaction to its implementation. It is hoped that a 600 megawatt capacity project will be started in 1967/68 for completion in 1975.

Page 19
Para 66

**Add at end of para. "General progress is satisfactory and work is slightly ahead of schedule. The first stage, the opening of the diversionary canal, was completed in May 1964 and the installation of the generating sets has been re-phased as follows:-
a. Sets 1 and 2 - late 1966
b. Sets 3, 4 and 5 - late 1967
c. Sets 6, 7, 8 and 9 - late 1968
d. Sets 10 and 12 - late 1969

Para 67

**a. Sub-para (c). The second station has been postponed to the 1970's.
b. Sub-para (e). Two hydro-electric stations will be built in connection with new barrages which must be built to protect existing works on the Nile from the scouring which will follow the completion of the High Dam:-
(i) Sohag, 85 megawatts capacity, for completion by 1969.
(ii) Silsileh, 95 megawatts capacity, for completion by 1970. Czechoslovakia and a Franco-German consortium are competing for these projects.
c. Add Sub-para (f)

Ismailia. Czechoslovakia has a contract for a 2x100 megawatt thermal power station. Work to begin in 1966.

d. Add Sub-para (g).

It is hoped to back the ambitious power programme with adequate technical and research facilities such as an extensive laboratory with high voltage equipment, a digital computor for planning distribution of loads on the grid and an analogue computor for research work.

Page 24,
Appendix C,
Serial 5

**Regional Fresh Water Supplies

A comprehensive well drilling programme in the "New Valley" area, particularly in Dukhla and Kharga Oases is providing many additional sources yielding good supplies of artesian water.

Page 36
Appendix 'E'

**a. Serial 7 (k) should read "Began operating. Czechoslovakia to build a 2 x 30 megawatt plant, due for completion in 1967.
b. Serial 8 (a) should read "Talkha"
c. Serial 10(b) should read "45'"
10(h) should read "1959^{2}"
10(k) delete "1965" substitute "1967."

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BRITISH INTELLIGENCE SURVEY

EGYPT

Part VIII (C): MILITARY ENGINEERING RESOURCES

D/26/VIII (C): October 1963

RECORD OF AMENDMENTS

Amendment		By whom entered	Date entered
No.	Date		

Joint Intelligence Bureau, Ministry of Defence, London.

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A

D/26/VIII (C)

BRITISH INTELLIGENCE SURVEY ON EGYPT

1. This report covers Military Engineering Resources in Egypt and is one of a series dealing with subjects of particular interest to Service Staffs. The reports are also distributed to various Government departments. A distribution list is given on page 38. The various Parts of the B.I.S. are issued separately for the convenience of users, and to speed up preparation and revision.

2. Other Parts of the B.I.S. which have been or will be issued in this series are as follows (date in brackets if issued).

III (B)	Oil
V	Transportation
VI	Airfields (see paragraph 3 below)
VII	Beaches and Landing Places (November 1954)
VIII (A)	Terrain, Climate and Map Coverage
VIII (B)	Towns
IX	Defences (June 1960)
X (A)	Health (June 1961)
X (B)	Telecommunications

3. Information on Airfields and Flying Boat Bases is to be found in the Airfield Handbook J.5/19 (A) and Regional Study J.5/103/1. Ports are described in the J/4/4 series of Port Information Sheets. A general survey of Egypt is included in the J.I.B. series of Intelligence Briefing Memoranda (No. J/95).

4. The information in this report is that available in J.I.B. as at October 1963. Some of the information given in Appendix D—Water Supply, Main Towns, Suez Canal Area and Gaza Strip, is old and should be used only as a guide.

5. Place-name spellings are, as far as possible, those found on Map 1 : 500,000, Series 1404, Edition 3—GSGS.

6. J.I.B. would welcome the views of users of this report on:—

(*a*) any statement considered incorrect;

(*b*) any notable omissions;

(*c*) any means of improving the method of presentation.

7. New information received in J.I.B. will be promulgated as soon as possible by the issue of the following, depending on circumstances:

(*a*) A *new edition* of this report.

(*b*) *Check Bulletins*. These will show the main changes affecting the information contained in this report and in any amendments to it issued under (*c*) below. The Check Bulletin should be *retained with this report and consulted whenever the latter is used*. (As Check Bulletins are cumulative, only the latest need be retained).

(*c*) *Amendments* in the form of new pages, for incorporation in this report. It is important that such amendments should be correctly incorporated (and recorded on the sheet provided at the front of this report). In preparing Check Bulletins it is assumed that this has been done.

8. Requests for further information, including more detail than that in the text, should be made to:—

THE DIRECTOR,
JOINT INTELLIGENCE BUREAU,
MINISTRY OF DEFENCE,
METROPOLE BUILDINGS,
NORTHUMBERLAND AVENUE,
LONDON, W.C.2,
(WHItehall 8474, Extension 637)

or to any overseas J.I.B.

D/26/VIII (C)

BRITISH INTELLIGENCE SURVEY

EGYPT

MILITARY ENGINEERING RESOURCES

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D/26/VIII (C)

EGYPT

MILITARY ENGINEERING RESOURCES

INTRODUCTION

General

1. *Aim.* The aim of this report is to provide information on the extent to which the engineer aspects of military operations in the Republic of Egypt could be supported by local resources.

2. Other factors, notably terrain, climate and transportation, which might affect the use or development of local engineering, water and electric power resources are dealt with in the related Parts of this survey as enumerated on page 3, paragraph 2.

3. *Maps.* The maps issued with this report are intended to serve only as a guide. Points of detail arising from studies of this survey should be located on Map 1 : 500,000, Series 1404, Edition 3—GSGS. The country is also covered by Series P.502 at 1 : 250,000, now issued with U.T.M. grid. Cover at 1 : 100,000 (Series P.677); 1 : 50,000 (Series P.773); and 1 : 25,000 (Series P.871); all with U.T.M. grid exists for large parts of the country, especially the Nile Valley and Mediterranean Coast. There are " goings " maps at 1 : 250,000 covering parts of Northern Egypt and Sinai (GSGS 4386A and GSGS P.502S).

National Resources

4. *The Economy.* Egypt is still largely dependent on agriculture which is practised, mainly under conditions of perennial irrigation, in the narrow fertile belt along the Nile and in the Delta. Cotton is the most important export crop. Crude oil is produced from oilfields on either side of the Gulf of Suez and is refined locally at Alexandria and Suez ; some oil products are, however, still imported. Coal is present in Sinai and the Kharga Oasis but is not yet mined. Other mineral deposits exploited include high-grade iron ore in substantial quantities and smaller amounts of manganese, zinc, lead and asbestos. There are no forests and all timber requirements are imported. Basic construction materials, including limestone, are abundant.

5. *Industry.* Egyptian manufacturing industry, although small by Western standards, is expanding under the current series of Five-Year development programmes and already produces many items which were previously imported. Most of the industry is now nationalised or subject to some form of Government control. A fair proportion of the country's available resources are likely to be absorbed by the construction of the Aswan High Dam and associated projects for some years but industrial development can be expected to continue at a moderate pace. On completion of the dam, the increase in water and electric power resources available should result in a general expansion of industry as well as increased agricultural production.

6. Much of the present industrial capacity is devoted to the production of textiles, fertilisers and consumer goods but useful amounts of engineering stores are manufactured. These include cement and other basic construction materials, some iron and steel, industrial gases and bituminous road surfacing materials. A limited range of mechanical and electrical engineering stores, including a few vehicles are also produced. More complex engineering plant and stores are imported. Certain details of industrial establishments, too numerous to list in this report, are available in J.I.B. and can be supplied on request.

Types of Construction

7. The general standard of building design and construction is high in Government establishments and urban central areas. Reinforced concrete structures and buildings of stone and burnt brick are common; interior finishings,

fixtures and services are to modern standards. Roads and mains services are good. In some of the older quarters and fringes of the main cities, in remote towns, and in most villages, conditions are more primitive. Traditional methods, using mud brick or masonry walling and flat mud roofs are usual; made-up roads or modern services are rarely present. Recently constructed Government housing is of durable construction and is provided with at least the minimum essential services, even in rural areas. Industrial buildings are of conventional modern design and construction.

LOCAL ENGINEER SUPPORT

THE CIVIL ENGINEERING AND CONSTRUCTION INDUSTRY

8. *General.* The Egyptian contracting industry is well developed and is fully capable of undertaking major building projects. In the more complex civil engineering schemes the industry still requires the services of foreign consulting engineers for planning and design; to a lesser extent, foreign specialist contractors are still necessary for the execution of certain works. In circumstances of Egyptian co-operation, military works could be carried out by contract in the more populous areas. It is believed that practically all the construction and civil engineering industry is now subject to some form of Government control.

9. *Government Construction Agencies.* The Central Government Ministries concerned with engineering and construction works are:—

(*a*) Ministry of Public Works.

(*b*) Ministry of Local Administration, Housing and Utilities.

(*c*) Ministry of the High Dam (concerned with the construction of the Aswan High Dam and related works only).

Details of the exact division of responsibility between the two Ministries at (*a*) and (*b*) above are not known but it is likely that the Ministry of Public Works handles the construction and maintenance of Central Government establishments, including electrical and mechanical services; and the Ministry of Housing, Local Administration and Utilities is responsible for policy on housing, local electricity and domestic water supplies, although most of the executive functions are carried out through local authorities. The head offices of all ministries are in Cairo.

10. *Local Government Construction Agencies.* The local government system in Egypt divides the country into:—

(*a*) Governorates.

(*b*) Cities and main towns.

(*c*) Minor towns and villages.

The units are administered by Governorates, City or Town and Village Councils who are responsible for their own community works and maintenance of public utilities. Representatives of appropriate Central Government ministries are members of the local councils.

LABOUR

11. The labour force engaged in civil engineering and construction is estimated at about 150,000. There is a fair number of Egyptian professional engineers, trained locally and abroad. The availability of properly qualified men, however, hardly meets the demands of the programme of development works now proceeding. Artisans of the building and civil engineering trades are in better supply but good men of the mechanical and electrical trades are at a premium. Large numbers of unskilled labour are normally available except in remote areas. The Ministry of Labour maintains employment exchanges in the larger towns. Conditions of employment are governed by ordinance; trade unions are active although they are probably firmly under Government control. A local labour force of over 250,000 was employed by the Allies in Egypt at the height of the last war.

ENGINEERING RESOURCES

TIMBER

12. *General.* There is practically no standing timber of constructional value; recent plantings, mainly along canals and drains are of little significance. Imports, principally of sawn timber, are approximately 250,000 tons per annum. Fair stocks should be available at Alexandria and Suez, the main ports of entry, and in the Cairo area.

13. *Sawmills and Woodworking Shops.* There are no known large sawmills. The second Five-Year Plan (1960–65) provides for the establishment of sawmills and seasoning kilns at Alexandria and Suez, each of 1·75 million cu. ft. capacity annually, so that foreign exchange may be saved by importing timber in log. A timber preservation plant for the pressure impregnation of telegraph poles and railway sleepers is also planned. There are many small woodworking shops, mainly in and around Cairo and Alexandria, engaged in the production of builders joinery and furniture; many of these possess woodworking machinery.

14. *Plywood and Hardboard.* Three small works produce a total of 136,000 cu. ft. of plywood annually and further facilities for manufacture are included in the second Five-Year Plan. A newly constructed factory at El Mansura with a capacity of 7,000 tons of hardboard per annum was due to start production in March 1963.

STONE, SAND AND GRAVEL

15. Materials for concrete aggregate and road metal are abundant in most areas, although some places immediately adjacent to the Nile and Delta possess only sands and gravels. Granite, basalt and hard sandstone are quarried in certain areas but limestone is more commonly used because of the accessibility of this material to the urban centres of the Nile Delta and lower valley. Quarrying is carried out in many places, notably east and south-east of Cairo (limestone), north-east of Cairo (basalt) and at Aswan (granite). The larger quarries are worked by mechanical plant; quarrying for the construction of the Aswan High Dam being particularly highly mechanised. Regional resources of stone, sand and gravel, and the location of known main quarries are given in Appendix A.

CEMENT AND ASSOCIATED PRODUCTS

16. *Cement.* Raw materials for cement manufacture are abundant. The Egyptian cement industry, located around Helwan, south of Cairo, and at Alexandria, is of major importance. Production in 1961 totalled 2·2 million tons of all grades of cement. This satisfied all local demands and provided a surplus of 511,000 tons for export. Current output is probably about 2·5 million tons per annum. Practically all types of cement are manufactured including standard Portland, white, rapid-hardening, sulphate-resisting, low-heat and ferro-cement; quality conforms to British Standard Specifications. Details of existing cement works are given in Appendix B. Further expansion of the cement industry is planned but firm details are not available.

17. *Cement Products.* Pre-cast concrete and asbestos-cement products are manufactured in considerable quantities, principally in and around Cairo and Alexandria. Production in 1961 consisted of 50,000 tons of asbestos-cement sheeting, pipes and moulded work; 60,000 tons of reinforced concrete pipe and about 3·6 million sq. yds. of pre-cast paving and tiling.

18. *Lime and Gypsum.* The extensive limestone and gypsum deposits are exploited, east of the Nile, at places between Qena and Cairo; gypsum is also quarried at El Ballah, north of Ismailia. Lime and plaster are produced in considerable quantities. Sand-lime bricks are manufactured on a large scale, notably at Abbasiya (East Cairo) where abundant quantities of quartz sand are also available.

CLAY PRODUCTS

19. A modern brick-making industry, established mainly on the outskirts of Cairo, manufactures large numbers of machine-moulded burnt clay bricks and tiles. Hand-made clay bricks, sun-dried or burnt in more primitive kilns are produced throughout the lower Nile Valley and the Delta. Refractory bricks, drainpipes and some sanitary-ware are also manufactured.

IRON, STEEL AND NON-FERROUS METALS

20. *Iron and Steel.* Egypt possesses a small steel industry based on the large deposits of iron ore available in the country. Although the industry is being considerably expanded under the second Five-Year Plan, much of the country's steel requirements will continue to be imported, at least for some years. Local production in 1961 included:—

Steel sections (believed to be of light to medium sections and including rails)	35,000 tons.
Steel plate and sheet (mainly light gauge sheet) ..	49,000 tons.
Reinforcing steel bars	180,000 tons.
Cast iron	49,000 tons.

It is intended to expand the rate of production of existing items and to manufacture steel wire, strip and malleable castings during the second Five-Year Plan. Fair stocks of steel of small and medium sections should normally be available.

21. *Steelworks and Iron Foundries.* Two-thirds of the iron and steel production is manufactured by the Egyptian Iron and Steel Company at its works about 5 miles south of Helwan. The only other works of any consequence, all producing small quantities of reinforcing steel bars or wire are:—

Delta Trading Company ..	On the Ismailia road, outskirts of Cairo
National Metal Industries ..	Abu Za'bal
Egyptian Copper Works ..	Alexandria

Small foundries in the main centres produce a variety of iron castings.

22. *Non-ferrous Metals.* Small quantities of copper, brass and aluminium sheet, and tubing are manufactured locally, mainly from imported ingots. The Egyptian Iron and Steel Company of Helwan and the Egyptian Copper Works of Alexandria (see paragraph 21 above) are the principal producers. Non-ferrous castings are made in a number of small foundries.

OTHER MANUFACTURED ENGINEERING STORES

23. *Existing Production.* A fair range of other items of engineering interest are manufactured in small factories located mainly around Cairo and in the Delta. These include:—

- Builders Ironmongery
- Ceramics
- Cordage
- Fabricated Steelwork
- Glass
- Paints
- Sheet Metal Work
- Vehicle Tyres and Tubes
- Water Heaters (Gas)
- Wire and Wire Netting

Mechanical Engineering Products ..	Limited production but including a few vehicles, small diesel engines and pumps, all of which probably require some imported components.
Electrical Engineering Products ..	Light cable, small transformers, meters, batteries, lamps and fluorescent tubes. Small air-conditioning units and a few refrigerators; imported components are probably necessary.

24. *Future Production.* Industries to be established under the second Five-Year Plan include projected manufacture of the following:—

- Air Compressors
- Electric Cable
- Electric Motors
- Electrical Switchgear
- Fluorescent Tubes
- Particle Board
- Pumps (Petrol)
- Pumps (Water)
- Steam Boilers (small capacity)
- Steel Scaffolding
- Steel Shuttering (for concrete work)
- Steel Wire Ropes
- Trucks and other Vehicles

Industrial Gases and Welding Materials

25. Oxygen, acetylene, carbon dioxide and other industrial gases are manufactured in Cairo and Alexandria. Facilities for the overhaul and repair of gas welding equipment are available in Cairo. Plant for the manufacture of electric welding electrodes was due to be installed under the First Five-Year Plan and production may have commenced.

Bitumen and Asphalt

26. Bituminous road surfacing materials are produced by the Suez and Alexandria oil refineries. Production in 1961 was 150,000 tons.

Bridging Materials

27. Only small stocks of the heavier steel sections are likely to be available with Government construction agencies and the Egyptian Railways. Small sections and concrete reinforcing steel should be in more plentiful supply in the main centres. Timber of bridging quality, in baulk sizes, would not be easily obtainable. Medium- and small-sized vessels and lighters are numerous at Alexandria, Port Said, Suez, on the navigable stretches of the Nile, and on the Suez and other canal systems. Facilities for the repair of vessels and the construction of small craft are available in marine workshops at seaports and at places on inland waterways.

Mechanical Equipment

28. *Plant.* Mechanical construction plant is now commonly used for road construction and larger building and civil engineering projects, particularly on such schemes as the Aswan High Dam and related irrigation works. Much of the equipment currently in operation is of Soviet Bloc origin but recently considerable quantities of earth-moving plant of United Kingdom manufacture has either been delivered or is on order; United States plant is also imported. Concrete batching and mixing plant of 110 cu. yds per hour capacity has recently been installed in the area of the Aswan High Dam. Load-carrying vehicles are available in fairly large numbers in and around the main towns.

29. *Repair Facilities.* Mechanical engineering workshops are established in or near the main towns in the north. Although not necessarily engaged on plant and machinery repairs, most could be adapted for the purpose. There are Egyptian Railways workshops at Cairo, Tura (29° 56′ N., 31° 16′ E, near Cairo), Alexandria and Abu Za'bal. The larger workshops are equipped with machine tools capable of the manufacture of less complicated components. Workshops have been established in the area of the Aswan High Dam specifically for the maintenance of plant engaged on the project. Garages in smaller towns might carry out minor repairs. The position regarding spares in unknown, stocks are likely to be small and probably available only with the stores departments of Government construction agencies.

Demolition Stores

30. Explosives are manufactured at Abu Za'bal. The exact types of explosives produced are not known but 1961 production of demolition types was:—

Detonators	218,000
Safety Fuze	3·7 million metres
Gunpowder	17 tons
Dynamite or Gelignite	642 tons
" Dynamite Powder "	1,193 tons (probably a nitrocellulose compound or TNT).

WATER SUPPLIES

GENERAL

31. Egypt is an arid country and water supplies are inadequate over most of its area. Rainfall, which occurs infrequently between November and March, averages between 7 and 9 ins along the Mediterranean coast but decreases sharply inland to about 1 in. at Cairo and to virtually nil further south. The rainfall contributes little to the fresh water resources of the country; with certain exceptions the available water supplies have their origin in the higher rainfall over the Equatorial belt, outside Egypt, to the south. These supplies reach the country either by the River Nile, which is by far the most important source, or by northward, underground seepage through porous rocks underlying the Western Desert.

32 *Perennial Surface Water*. Except for a few small streams in the southern Sinai Mountains, the Nile is the only perennial river. The whole economy of the country depends on the ordered regulation and even distribution of the Nile waters and a complex system of dams, barrages, canals and drainage channels has been developed to achieve this. Domestic supplies as well as irrigation water are drawn from the Nile and its canal systems. A description of the Nile and its control and distribution works is included in Section XI of the General Report on Egypt, No. J.I. 2/194 of October 1957 (shortly to be revised in BIS Part VIII (A)).

33. *Seasonal Surface Water*. In the more elevated regions of the Eastern Desert and Sinai, and at lower levels in proximity to them, seasonal supplies are present in wadis and pools after the sporadic rains. Birket Qarun in the Faiyum Depression; Lakes Manzala, Burullus, Idku and Maryut at the outlets of the Delta; and the lakes in the area of the Suez Canal, are all brackish.

34. *Underground Water*. Along the Nile Valley and in the Delta, the river itself maintains a vast underground reservoir in the sands, gravels and other porous material underlying the surface silt. Oases in the Western Desert obtain supplies from artesian or semi-artesian sources present in the Nubian sandstone. The water is fresh where the sandstone is exposed but is often brackish where other rocks containing mineral salts intersect the water-table. Limited ground-water exists along the Mediterranean coast where the rainfall is absorbed into the sands and other porous beds but only as freshwater lenses floating on underlying salt water. The sporadic rainfall on the Red Sea Mountains is not lost entirely to run-off and evaporation. In favourable geological conditions it is partially absorbed to reappear lower down as springs; or in permeable formations flanking the mountains, it forms a water-table yielding limited and sometimes brackish supplies. Similar conditions probably exist in Central Sinai but little exploratory work on groundwater has been carried out.

35. The regional fresh water resources of Egypt are summarised in Appendix C.

OPERATIONAL WATER SUPPLIES

36. The general position regarding water supplies available to a military force in likely operational areas of Egypt are summarised below:—

(*a*) *Nile Valley, Delta and Faiyum*. Adequate supplies would be available throughout the year from established mains water supply systems. Most town systems incorporate purification plant and storage. (See Appendix D Part I.)

(*b*) *Canal Zone*. Adequate supplies would be available throughout the year from established mains water supply systems incorporating purification plant and storage. All developed systems are based on supplies from the Ismailia (Sweetwater) Canal. (See Appendix, Part II.) There are alternative sources in wells and boreholes but these yield limited supplies.

(*c*) *Western Desert* (*Coastal Areas*). West of Alexandria fresh water is scarce. Limited supplies are obtained from shallow wells, galleries and cisterns. The condition of the 1939–45 war pipeline and its pumping stations, extending westwards from Alexandria, is not known; it is hoped to include this information in a future Check Bulletin.

(*d*) *Sinai*. Limited supplies are available from a few wadis and springs in more elevated regions and from scattered wells elsewhere, mostly in the vicinity of wadi beds. The Gulf of Aqaba coast is almost waterless.

(*e*) *Gaza Strip*. Fair supplies are obtainable from wells and boreholes. (See Appendix D, Part III.)

37. Troops operating in Egypt would require field water supply and purification equipment, and water tankers. Well sinking rigs and pipeline equipment would probably be required in a protracted campaign; field distillation plant would be useful in remote coastal areas. Although the mains supply systems of many towns are purified, many sources, particularly the canals, are grossly polluted and must be treated accordingly.

Note. Details of minor water sources in remote areas too numerous to list are available in J.I.B. Much of the information is of sources in the Western Desert and Sinai used in the 1939–45 war.

Responsibility for Water Supplies

38. The exact division of responsibility for water supplies in Egypt is not known but the following authorities are concerned:—

(*a*) *Ministry of Public Works* (*Water Supply Authority*)	Probably responsible for the water supplies of Government establishments and for providing technical assistance to other authorities.
(*b*) *Ministry of Housing, Local Administration and Utilities*	Believed to control policy on domestic water supplies in cities, towns and villages, executive control being exercised by the authorities quoted in (*c*) and (*d*) below.
(*c*) Municipal Authorities	Responsible for the construction, operation and maintenance of their own water systems; technical and financial assistance being provided by the Central Government.
(*d*) Village Authorities	
(*e*) *Desert Reclamation Department*	Provides boreholes, wells and water supply systems in desert development areas.
(*f*) *Suez Canal Authority*	Responsible for water supplies in the Canal Zone, including the systems serving Port Said, Ismailia and Suez.

Water Supply Plant and Stores

39. Mechanical pumping plant is widely used in Egypt, particularly for irrigation along the Nile and in the Delta. The larger and more complex units are imported but limited numbers of small centrifugal pumps are already manufactured locally. Production of a further 3,200 units per annum, including reciprocating and electric-submersible deep-well pumps is projected under the second Five-Year Plan. Fair stocks of spares for water supply plant and of stores in common use are probably held by Government and local authorities concerned with water supplies. Many small mechanical workshops manufacture simple spares. Plant may be of European, United States, Soviet Bloc or local manufacture. Metric standards are officially used in Egypt but much of the existing water supply plant and stores must be to British or United States standards.

Urban Water Supplies

40. All Egyptian towns of any size are located in the Nile Valley, the Delta or the Suez Canal area and possess adequate water sources either in the Nile, its canal systems or underground resources dependent on the Nile. Small towns elsewhere do not have adequate sources and suffer drought. Practically all towns are served by developed mains water supply systems incorporating some form of

storage, and in most cases, purification plant. Distribution systems in the larger cities and towns are extensive; all important buildings and establishments, and better class housing are directly connected. In poorer class districts of the cities and large towns, and throughout the smaller towns, much of the distribution is from communal points. Details of the water supply systems of the more important towns are given in Appendix D; some of the information is old, but will be useful as a guide, bearing in mind that if anything, the situation will have been improved since the date quoted.

RURAL WATER SUPPLIES

41. Most of the villages of the Nile Valley and Delta now possess some form of potable water supply system. Although some rural areas in the Northern Delta and the Faiyum are served by branch mains of larger schemes, most possess simple localised systems. These usually consist of a small mechanical or hand pump extracting water from the source and delivering to a storage tank, elevated to provide head if necessary. Water is then piped by gravity to communal points consisting of a number of bibcocks and a drainage trough. Water from open sources which is usually grossly polluted, is sometimes settled and purified but that from underground sources is rarely treated. In the more remote villages water is still drawn by primitive means from the nearest well, cistern or other source, although limited piped supplies are believed to have been provided recently in the Kharga and Dakhla Oases.

SEWAGE DISPOSAL

42. In 1959 there were foul drainage and sewage disposal systems serving the towns and areas listed below:—

Alexandria
Cairo
Damanhur
El Faiyum
El Mansura
Kafr El Zaiyat
Port Said
Suez
Tanta
Zagazig
Ex-British Forces Camps in the Canal Zone.

The city and towns systems are overloaded and in no case do they cover the whole of an urban area. The sewage effluent from Cairo is discharged to the desert or used for irrigation. Untreated sewage from the Alexandria system is discharged to sea through a number of outfalls along the coast; extensions to this system and for stormwater drainage in the centre of the town are planned for completion by 1965.

43. Other sewage disposal schemes have been reported as planned or under construction in the following towns:—

Aswan
Ismailia
Luxor
Qena
Rosetta

44. Elsewhere, if waterborne sanitary facilities are installed, disposal is to septic tank or cesspit. Bucket and pit latrines are used in many places. In rural areas conditions are primitive although the Government health authorities are endeavouring to educate the fellahin into more sanitary habits.

ELECTRIC POWER

GENERAL

45. Until 1960 Egypt relied almost entirely on fuel and diesel oil to operate its electricity generating plant. In 1960–61 the hydro-electric power station which had been installed at the Aswan Low Dam added almost 50 per cent to the country's

total generating capacity. The growth of capacity between 1953 and 1961 is shown below.

INSTALLED CAPACITY (MEGAWATTS)

	1953	1954	1955	1956	1957	1958	1959	1960	1961
Thermal ..	586	542	559	589	717	779	823	762	832
Hydro ..	—	6	6	6	6	6	5	350	350
TOTAL ..	586	548	565	595	723	785	828	1,112	1,182

46. The general plan for electrification, for the 20 years following its inception in 1959, was divided into a long-term and a short-term programme. The latter is contained in the Five-Year Plan for Economic and Social Development, July 1960 to June 1965. It provides for the electricity supplies to over 90 towns and villages and the expansion of capacity in power stations and extension of networks. Much of this work has, in fact, been carried out. The long-term programme includes the installation of the hydro-electric plant at the Aswan High Dam, a comprehensive national network and the expansion and building of other power stations in the course of the next 10 years to meet an annual growth of demand estimated at 50 megawatts per year. The types and locations of new power stations have been variously proposed as, more hydro-electric stations on new and existing Nile barrages, the use of the Qattara Depression for hydro-electric generation, more thermal power stations and nuclear power generation. It would appear from current negotiations that an atomic power station is to be the next step to increase capacity, together with new thermal power plants for Cairo and Suez.

ORGANISATION

47. *General.* The organisation for the planning, administration and operation of electricity generation and distribution is shared by a number of authorities and agencies; which does not make for efficiency or standardisation. At Government level, several Ministries are involved, with specialist departments; there are various Government agencies and concessionaire companies and a number of independent generating authorities, including industrial companies, generating and distributing their own electricity.

48. *Government Departments.* The ministries involved are:—

(*a*) Ministry of Public Works and its Mechanical and Electrical Department, responsible for the large power stations and networks in the Delta and Upper Egypt, serving particularly the irrigation systems.

(*b*) Ministry of Industry and its " Cairo Electricity and Gas Administration " (C.Eg.A.), which is responsible for the large power stations in the Cairo area and the supply of electricity to Cairo and its suburbs. The Minister of Public Works is chairman and the Minister of Finance is one of its board of directors.

(*c*) Ministry of Local Administration, Housing and Utilities, also having a Mechanical and Electrical Department, responsible for the supply of electric power to towns and villages.

(*d*) Ministry for the Aswan High Dam, with responsibility for the current construction works including the power station.

49. *Government Agencies and Concessionaire Companies.* The Government Agencies and Concessionaire Companies are:—

(*a*) Lebon et Cie, under mainly French capital ownership, had one concession for Cairo, which expired in 1948, being then taken over by C.Eg.A (para. 4 (*b*) above), and one for Alexandria. The latter, due to expire in 1970, appears to be in abeyance, and the installations serving it have been in the hands of the State Trustee since the events of 1956.

(*b*) Cairo Electric Railways and Heliopolis Oasis Company has the responsibility for the distribution of electrical energy for all purposes, except lighting, in the Heliopolis and " Barrack Quarter " areas. It also has a small emergency diesel power station at Heliopolis. The company buys its energy for distribution from,

(*c*) Societe Egyptienne D'Electricite (SEE) which operates Shoubra power station and which also supplies C.Eg.A., industries in the vicinity of Shoubra power station and a small number of private individuals.

50. *Independent Generating Authorities.* The following authorities generate their own electricity supplies:—

Suez Canal Authority,
Kom Ombo Company,
Alexandria Water Company,
Trams and Railways,
Radio Stations,
Ma'adi Land Company.

Industrial concerns generate an appreciable proportion of the national output, the most important industries in this respect being textiles, chemical, sugar and cement. A large amount of industrial machinery, however, is directly engine-driven, in 1953—700,000 horsepower.

POWER STATIONS

51. *General.* In mid-1961 there were 121 electric power stations in the country:—

Power (Megawatts)	Number	Installed Capacity		Energy Generated	
		Megawatts	Percentage of Total	Million Kilowatt-hours	Percentage of Total
Below 1	48	22·8	2·6	40·5	1·7
1–10	59	184·8	21·0	424·8	17·8
Above 10	14	666·8	76·4	1,922·4	80·5
TOTALS . .	121	874·4	100·0	2,387·7	100·0

The capacity and production of the private and public installations were as follows:—

Authority	Installed Capacity		Energy Generated	
	Megawatts	Percentage of Total	Million Kilowatt-hours	Percentage of Total
C.Eg.A	309·150	25·4	794·1	30·0
Lebon et Cie	82·850	6·8	331·8	12·6
M.E.D.	107·312	8·8	212·7	8·1
S.E.E.	57·700	4·7	199·2	7·5
Municipalities	57·075	4·6	110·6	4·2
Public Utilities	37·699	3·1	92·3	3·5
Aswan Low Dam	345·000	28·2	250·0	9·5
Private Industries	222·633	18·4	647·8	24·6
TOTALS . .	1,219·419	100·0	2,638·5	100·0

52. *Main Thermal Power Stations.* The main thermal power stations are concentrated in the Nile Delta area. Essential details of these stations are included in Appendix E and their locations are shown on Map C.

53. *Municipal and Pumping Station Electric Power Plants.* There is a large number of municipal and pumping station electric power plants, mostly diesel-driven and of small capacity. Little recent information is available on them, and many will be, or have been, relegated to stand-by status as new large power stations and their networks are built. A generalised picture of the locations of the more important of them is shown on Map C. There are small hydro-electric plants at the Faiyum Oasis and at Nag-Hammadi.

54. *Main Industrial Power Stations.* There are three large industrial power stations worthy of special mention, the locations are shown on Map C:—

(*a*) Mahalla al Khubra—textiles, 26·3 megawatts capacity.

(*b*) Egyptian Fertilizer Company, Suez—22·5 megawatts capacity, and

(*c*) Tura Cement—13·3 megawatts capacity.

55. *The Aswan Low Dam Power Station.* Construction was started in June 1953, and was completed in July 1961. Details are as follows:—

(*a*) *Location.* The power station is located on the west bank of the Nile in a natural creek 600 metres upstream of the main dam.

(*b*) *General Layout.* A short headrace leads to an intake dam and the power station. The turbines discharge into a surge basin from which the water flows through four tailrace tunnels. These tunnels pass beneath the navigation channel and discharge back into the river below the main dam through a tailrace channel. The switching station is located to the west of the surge basin.

(*c*) *Power Plant.* Seven 65,000 horse-power Kaplan turbines, each driving a 47 megawatt alternator, provide the main power capacity, and two 16,000 horse-power turbines coupled to 11·5 megawatt alternators, supply the auxiliary needs. This gives a total maximum installed capacity of 350 megawatts. Generation is at 11 kilovolts.

(*d*) *Switching Arrangements.* The main transmission lines are at 132 kilovolts and are supplied through seven 51 megavolt ampere step-up transformers at the outdoor switching station. The two 11·5 megawatt alternators are connected to an indoor 11 kilovolt switchboard which supplies the 3·3 house-service busbars through two 3 megavolt ampere transformers; they are also connected to the 132 kilovolt system through two of the 51 megavolt ampere transformers.

(*e*) *Utilisation.* 132 kilovolt transmission lines provide power for the construction work at the High Dam site, the Kima plant of the Egyptian Chemical Industries Co. 4 miles east of Aswan, and to irrigation plant in Qena, Aswan and Sohag Provinces. Aswan town is supplied from the 11 kilovolt busbars. The 3·3 kilovolt system is also interconnected with a 1,000 kilowatt diesel generating station, which was installed to supply the construction works, the new west bank colony housing the permanent staff attached to the station and the older east bank colony belonging to the Irrigation Department. Surplus energy generated by the smaller units is fed into the 132 kilovolt system.

TRANSMISSION AND DISTRIBUTION

56. *General.* The existing system and one version of projected transmission network from the High Dam are shown at Map C. The precise design and routes of the high tension lines to take the power of the Aswan High Dam hydro-electric power station northwards when the station begins to function is not yet known. Proposals for them have, in fact, only recently arrived in Egypt from the Soviet Union and will be subject to modification when studied. Consumers' supplies are generally at 220/380 volts, alternating current, single- and 3-phase, 50 cycles.

57. *The Delta Area excluding Cairo and Alexandria.* Between 1930 and 1932 Siemens Brothers of Britain built a 66 kilovolt network, the main sections of which are 150 miles long and the secondary sections 125 miles long. The main section runs roughly east/west at a distance of 12 to 18 miles from the Mediterranean coast. All the lines and stations were designed for 66 kilovolts, but due to unfavourable climatic conditions the network has been operated at 33 kilovolts since its construction. The first extension of this network was begun in 1953 with another 93 miles of line and three more stations at an operating voltage of 66 kilovolts. This was followed by extensions by East German firms from 1954 onwards which have, up to 1959, amounted to 187 miles of line, 13 transformer stations and 11 switching stations. These brought new pumping stations into service for irrigation and drainage, enabling increased agricultural production to be attained. In Tahrir Province, for example, large areas of desert are being made fertile by the power brought by the western spur of the network to Tahrir South. With the completion of the Zagazig-Abu Za'abal section, all the power stations in the Northern Delta area have been connected to those of the Cairo area and the network extended to Beni Suef in the South.

58. *The Cairo Area.* The power stations of Cairo North, Saptieh, Cairo South and El Tabbin feed into the 25 miles long, 63 kilovolts ring main. In contrast to the rest of the network, the working voltage of the Cairo ring, rated at 66 kilovolts, was fixed at 63 kilovolts and, except for one section, is of underground cable. The connections branching off outside the ring to north and south are chiefly overhead lines. Besides direct transformation from 10·5 kilovolts generated voltage to the consumer supply of 220/380 volts, some older stations and sections of the mains are operated at 3·5 kilovolts, 3-phase and at 2 kilovolts, single-phase. The 10·5/0·4 kilovolt transformer ratings are at 150, 300 and 450 kilovolt amperes.

59. *The Alexandria Area.* The high tension cable network is operated at 10·5, 5 and 2 kilovolts, the length of the low tension network is 360 miles. Consumers' supplies are generally 220/380 volts.

60. *The Canal Zone.* The power stations of Port Said, Ismailia and Suez are at present neither interconnected nor connected to the Delta network. Consumers' supplies are generally at 220 volts.

61. *The Fayum Oasis.* The oasis, about 60 miles south-west of Cairo, has small diesel and hydro-electric plants feeding a medium tension network, operated at 3·3 kilovolts.

62. *Upper Egypt.* The Nag Hammadi district has small diesel and hydro-electric plants with a 66 kilovolt network along a section of the Nile valley. The Idfu district, with a steam power station, has a 33 kilovolt network.

DEVELOPMENT

63. *The Cairo Area.* A new power station, Cairo West, is to be built, the main contractor being the Westinghouse Electric International Company of the United States. The project is being financed by an American loan of $30·6 million at nominal interest. The station will be located 10 miles north of Cairo, on the Nile, and will consist of a 261 megawatt modern reheat thermal electric power plant and 220 kilovolt step-up substation. It will feed low cost electric power into the 220 kilovolt network supplying electricity to Cairo and the Delta areas, and is scheduled to go into service in 1964.

64. *The Alexandria Area.* The British firm of Kennedy and Donkin is submitting designs for a nuclear power station in this area. The cost is expected to be between £15–£20 million and a special budget allocation has been approved. It is hoped the building contract will be placed by 1964 and that the station will be in operation by 1968. Another project in the area is the construction of a new 100,000 kilowatt power station at Tahrir, to start operating in 1967.

65. *The Qattara Depression.* The Qattara Depression runs north-east/south-west, beginning about 70 miles south-west of Alexandria. It is about 185 miles long, has a maximum width of 90 miles and an average depth of 195 feet,

its lowest point being 435 feet below sea level. The project entails a 35 mile long open channel or tunnel between the Mediterranean and the Depression, which, over a period of over 100 years, would allow sea water to pass continuously into the Depression to create a large lake. The depth and surface area of this lake would be gradually increased until a level would be reached at which the total quantity of water reaching the Depression in a given time would be equal to the effective total quantity of water escaping from it by evaporation and outward seepage. The project has been considered over the past 30 years and has currently been very favourably reported on by West German experts. The estimated electric power to be derived from the scheme is between 125 and 200 megawatts, producing up to 2,100 million kilowatt hours annually for the first 25 years and thereafter 2,000 million annually. It is thought that the execution of the project may well take place after the completion of the High Dam and other hydro power stations on the Nile.

66. *The Aswan High Dam Hydro-Electric Power Station.* The Aswan High Dam site is about 5 miles south of the existing dam and will, when completed, create the largest artificial lake in the world. It will be over 300 miles long, stretching into the Sudan, have an area of over 1,500 square miles and store about 130 milliard cubic metres of water. The dam itself will be of rock-fill construction, 3 miles long and 361 ft high. The generating plant will consist of 12 generators, each of 175,000 kilowatts capacity, giving a total installed capacity of 2,100 megawatts with an annual output of 10 milliard kilowatt hours. Work on the project is based on the following programme, which at the end of 1962, the third year of construction, was stated to be up to schedule:—

1963 Completion of diversion canal and control gates installed. Power Station designed and foundations laid.

1964 Nile will be diverted through diversion canal and tunnels, laying bare the space on which the High Dam will be built and on which work will begin. Power Station will be begun. (Construction work between mid-1963 and the 1964 Nile flood will be a critical phase.)

1965 Major part of main dam will be completed. Power plant arrives on site.

1966 High Dam almost finished. Installation of power plant begins and transmission lines started.

1967 Dam will reach height of 155 ft and permanent storage of water will begin. Three generators will be in place and operating. Power will be transmitted through one completed line to Cairo and other subsidiary lines to the extent of 1 milliard kilowatt hours per annum.

1968 Final construction of main dam completed. Three more generators installed and operating, transmission lines completed and an output of 3 milliard kilowatt hours per annum reached.

1969 Three more generators installed and operating. Output of 6 milliard kilowatt hours per annum.

1970 Power Station completed by installation of last 3 generators. Output 8 milliard kilowatt hours per annum.

1972 Optimum power output of 10 milliard kilowatt hours per annum attained.

67. *Other Projects.* Expansion of existing power stations is noted under column (*k*) in Appendix E. Other new power stations are projected as follows:—

(*a*) *Asyut.* A 60 megawatt thermal power station for which tenders have been called.

(*b*) *Suez.* A new power station of 100 megawatt capacity to be built with Soviet assistance to supply power to the two oil refineries, which are being enlarged, and the fertiliser plant, also being enlarged.

(*c*) *Aswan Low Dam.* A second hydro-electric power station is projected.

(*d*) *Sinai Peninsula.* A power plant, with 3 × 7,000 kilowatt turbine sets fuelled by natural gas, was being installed at the end of 1962 for the exploitation of ferromanganese.

(*e*) *The Nile.* A number of hydro-electric power stations on existing and planned Nile barrages are projected.

EGYPT

STONE, SAND AND GRAVEL—REGIONAL RESOURCES

Serial	Region	Materials available	Remarks (including known quarries)
	Nile Valley		
1	Sudan Border to Aswan	Sandstone, sand and gravel. Granite in the Aswan area and at Kalabsha (35 miles south of Aswan)	Granite quarried immediately south-east of Aswan and on Aswan (Elephantine) Island
2	Aswan to Isna	Sandstone, sand and gravel in places	Good material occurs as outcrops and ridges only. There are thick soil overburdens in flood plain areas
3	Isna to Nag Hammadi	Soft limestone and shales	Exposed in a few places only. Thick soil overburdens in flood plain areas
4	Nag Hammadi to Asyut	Limestone, sand and gravel	Thick soil overburdens in some areas *Quarries*— (i) Doronka; south-east of Asyut .. .. Limestone (ii) Khazindariya, Gebel Haridi; near Tahta Limestone (iii) Isawiya; east of Akhmim .. .. Limestone (iv) Qena .. .. Limestone
5	Asyut to Cairo	Limestone, sand and gravel	Mainly from scarps fringing the valley. In the Faiyum Depression materials are scarce except in the bordering escarpments. There is thick alluvium in areas under irrigation *Quarries*— (i) Atar El Nabi } south-east of Cairo .. Good, hard limestone (ii) El Basatin } (iii) The area of the limestone escarpment, east of Cairo from the Muqattam Hills (30° 02′ N., 31° 17′ E.) south to Helwan, contains many quarries connected by light railways to the valley

			(iv) Gebel El Ahmar; east of Cairo ..	Sandstone and sand
			(v) Abbasiya; East Cairo	Quartz sand
			(vi) Abu Za'bal; 15 miles north-east of Cairo	Basalt
			(vii) Hills overlooking Birket Qarun	Basalt
6	*Nile Delta*	There is virtually no exposed rock. Sand and gravel are available in places	Area consists of very thick alluvium with brackish swamps and lakes near the coast	
	Western Desert			
7	Mediterranean Coast	Sand and gravel. Some limestone ridges	*Quarries*—	
			(i) El Mex (31° 09′ N., 29° 51′ E.) west of Alexandria	Limestone
			(ii) Dekheila; west of Alexandria	Sand
8	Northern and Central Areas	Limestone, sand and gravel	Very thick overburdens of dune sand in many areas. Depressions such as the Qattara and Siwa, Bahariya and Farafra Oases contain little good material except on their fringes	
9	Southern Areas	Hard sandstone and sand; granite and basalt outcrops in south-west		
	Eastern Desert			
10	Northern Areas	Hard limestone, sand and gravel is abundant	Dry wadi beds and escarpment screes provide accessible material	
			Quarry—	
			Ataqa (29° 55′ N., 32° 20′ E.)	Suez Canal Authority quarry
11	Southern Areas	Sandstone, sand and gravel abundant		
12	Red Sea Hills	Hard rock, including granite and volcanic rocks, sand and gravel abundant		
13	Gulf of Suez and Red Sea Coasts	Limestone, including coral limestone, sand and gravel commonly available		
	Sinai			
14	Sinai Mountains (South Sinai)	Granite and other hard rocks predominate		

Serial	Region	Materials available	Remarks (including known quarries)
15	Central Highlands	Limestone, hard in the Egma Plateau, softer in the El Tih Plateau	
16	Mediterranean Coast and Coastal Plain	Little exposed material except for dune sand	Sand dunes inland, marshy flats at the coast
17	Gulf of Suez Coast	Limestone, including flinty limestone in north; granite in hill escarpment in south. Sand and gravel	The narrow coastal plain is mainly sandy, but rock and gravel are available in dry wadi beds
18	Gulf of Aqaba Coast	Hard rock and gravel abundant	

EGYPT

CEMENT FACTORIES—1963

Serial	Co-ordinates	Location	Name of Company	Capacity (tons per annum)	Remarks
1	29° 56′ N., 31° 16′ E.	Tura	Torah Portland Cement Company (Nationalised ex-Ste Egyptienne De Ciment Portland Tourah)	900,000	Oil-fired plant. Limestone and gypsum quarried in Tura Hills, local clays. Labour force—1,130
2	29° 51′ N., 31° 21′ E.	Helwan	Helwan Portland Cement Company (Nationalised)	940,000	Oil-fired plant. Limestone and gypsum quarried in Helwan Hills, local clays. Labour force—1,322
3	29° 46′ N., 31° 18′ E.	El Tabbin	National Portland Cement Company (part Government-owned)	420,000	Oil-fired plant. Local limestone, gypsum and clays. Slag from Helwan steelworks. Labour force—904
4	31° 10′ N., 29° 53′ E.	Alexandria	Alexandria Portland Cement Company (Nationalised)	150,000	Oil-fired plant. Limestone from Mex ridge, west of Alexandria. Labour force—182

EGYPT

REGIONAL FRESH WATER SUPPLIES

Serial	Region	Water Supplies
1	Nile Valley and Delta (including Faiyum Depression)	*Surface Water.* Plentiful supplies are available from the Nile and its canal and irrigation systems. The Faiyum Depression receives its water supplies from the Nile via the Lahun Barrage and Waftis Canal; Birket Qarun which drains the Depression is brackish. The swamps and lakes to the north of the Delta are brackish *Underground Water.* The Aquifer bordering the Nile and underlying the whole of the Delta contains abundant supplies which are exploited by numerous wells and boreholes. In North Delta areas sea-water intrusion causes salinity in wells if over-pumped. Many wells, even in rural areas, are equipped with mechanical pumps *Developed Systems.* There are mains supply systems serving the towns and certain rural areas
	Mediterranean Coast	
2	West of the Delta	West of Alexandria fresh water is scarce. Limited supplies are obtained from shallow wells, galleries and cisterns. A few wells sunk in strata overlying impervious beds remain fresh but many yield saline supplies if over-pumped. A 10·6 ins water pipeline capable of carrying 1·2 million gallons per day from the El Nubariya Canal near Alexandria was constructed along the railway to the Libyan Frontier during the 1939–45 war. This is still *in situ* but the present condition of the system and its pumping station is not known
3	North Sinai Coast	Fresh water is scarce in areas of salt marsh (sabkhas) and sand dunes comprising much of the area. Limited supplies are obtained from shallow wells and cisterns. Although the Wadi El Arish rarely carries surface water to the sea, wells dug in its bed usually yield some water
	Western Desert	
4	General	The region is virtually waterless except at oases in local depressions where the desert falls within reach of the water-table. These are situated mainly in central and south-east areas of the desert. In the north and east the permeable rocks lie too deep to offer prospects of underground supplies. A few widely scattered wells and springs in limestone areas overlying the sandstone depend on the very infrequent rain for replenishment; these provide unreliable supplies to nomads

5	Barariya Farafra Dakhla Kharga } Oases	Adequate supplies from artesian and semi-artesian wells. Water is of good quality
6	El Arag El Bahrein Sitra Siwa } Oases	Brackish supplies from artesian and semi-artesian wells only
7	Qattara Depression	There is no fresh water. Salt marshes (sabkhas) and saline lagoons only are present. The area is uninhabited
8	Wadi El Natrun	The small lakes in the depression are not potable
	Eastern Desert	
9	Region between the Nile Valley and Red Sea Hills	Water is very scarce, particularly away from the base of the Red Sea Hills. In the limestone plateau to the north of Wadi Qena, sporadic discharge from seasonal wadis on the western flanks of the Red Sea Hills provide some supplies. Where the strata is porous, limited yields are obtained from a few wells and cisterns. The sandstone plateau to the south absorbs the limited run-off from the Red Sea Hills, as in the Wadi Qena, and artesian or semi-artesian wells are found in a few places. Throughout the region, wells dug in trunk wadi beds and replenished by sporadic discharge are the usual sources but yields are meagre, unreliable and often brackish
10	Red Sea Hills	Surface water is present in wadis for brief periods after sporadic rain. A few seasonal springs and wells and cisterns provide limited supplies in a few valleys
11	Gulf of Suez and Red Sea Western Coasts	Water is very scarce. A few shallow wells and unreliable springs provide limited supplies of poor quality to the few settled places along the coasts

Serial	Region	Water Supplies
	Sinai Peninsula (excluding North Sinai (see Serial 3))	
12	Sinai Mountains (South Sinai)	Rainfall is higher than over the rest of Egypt and there are a few perennial or near-perennial streams mainly on the west side of the mountains. Supplies are drawn from these sources and from a few wells
13	Central Sinai	On the El Tih plateau, water is obtained from springs and wells, mainly in the vicinity of seasonal wadis. Small oases in the lowlands north of the El Tih plateau are situated on the courses of the larger seasonal wadis, notably Wadi El Arish. The oases are watered from wells and springs yielding small to moderate supplies
14	Gulf of Suez Eastern, and Gulf of Aqaba Coasts	Springs and wells yield brackish water in or near dry wadi beds along the Gulf of Suez coast but such sources are infrequent to the south. There are no known sources of water along the Gulf of Aqaba coast; a few wadis may carry a limited seasonal flow and wells dug in their vicinities may yield some water
15	*Suez Canal Area*	Adequate supplies are available from the Ismailia/Sweetwater Canal system. The canal draws water from the hill at a point in the north suburbs of Cairo and then flows north-east to El Abasa where one branch turns north-west to Zagazig and the other continues east to Ismailia. At Ismailia one leg turns north to Port Said and the other south to Suez. Other, more limited, supplies are available from wells and boreholes in the area. (See also Appendix D for details of developed water supplies in the Suez Canal Zone)
16	*Gaza Strip*	Fair supplies are obtainable from wells and boreholes. Over extraction causes salinity and for this reason pumping is normally restricted to a maximum of 12 hours per day. (See also Appendix D for developed supplies)

EGYPT

WATER SUPPLIES—MAIN TOWNS, SUEZ CANAL AREA AND GAZA STRIP

Serial	Co-ordinates	Place	Source of Supply	Capacity (gallons per day)	Storage (gallons)	Treatment	Date of Infor-mation	Remarks
	Part I. Main Towns							
1	31° 12′ N., 29° 54′ E.	Alexandria	El Mahmudiya Canal	49 million (treated water) 6 million (additional untreated water)	100 million (total)	Clarification, filtration and chlorination	1954–61	Canal draws off the Rosetta branch of the Nile at El Mahmudiya. There are two systems which are interconnected:— (*a*) Pumping station at Farkha, pumping from the canal and supplying Round Point Waterworks by gravity where treatment takes place before delivery to the mains. Capacity—32 million gallons per day. (*b*) The Siyuf Waterworks pumps raw water from the canal, carries out treatment and pumps to the mains. Capacity—17 million gallons per day. There is a treated water reservoir, capacity 3·3 million gallons and booster pumping station at Fourm El Gueraza, and a balancing reservoir of 3 million gallons capacity at Kom El Dikka. Facilities exist in the port area for watering ships both from hydrants at quayside and water barges. The Minet El Bassal Pumping Station supplies water to the hydrant and sprinkler system at 100 lb per sq. in., maximum output is 220,000 gallons per hour. The Hagar El Nawatieh Pumping Station supplies untreated water to the Ramleh Gardens area. Capacity—5·5 million gallons per day. All waterworks and pumping stations were equipped with a mixture of electric and diesel-driven plant in 1954. The town system was linked to the Western Desert pipelines which draw supplies from the Nubariya Canal but the condition of this branch is not known.

Serial	Co-ordinates	Place	Source of Supply	Capacity (gallons per day)	Storage (gallons)	Treatment	Date of Information	Remarks
2	24° 05′ N., 32° 53′ E.	Aswan	Nile	950,000 (treated water)	55,000 (treated) 55,000 (untreated)	Filtration (probably chlorinated also)	1954	Supplies drawn direct from the Nile by a waterworks located nearby, treated and delivered to the mains system
3	27° 11′ N., 31° 11′ E.	Asyut	Boreholes	Adequate	220,000 (elevated tank; probably more)	Clarification, filtration and chlorination	1959	New water supply system under construction in 1959, probably now completed
4	30° 28′ N., 31° 11′ E.	Benha	Taufiqi Canal	1,155,000	Not known	Filtration and chlorination	1954	Canal draws off the Nile
5	29° 05′ N., 31° 05′ E.	Beni Suef	Nile	1,650,000	Not known	Filtration (probably chlorinated also)	1954	
6	30° 03′ N., 31° 15′ E.	Cairo	(*a*) Nile	35 million (1956 figure, has probably been considerably expanded since)	Total not known (see remarks)	Fully treated (see remarks)	1954	(*a*) *Supply to Cairo City.* Water drawn direct from the Nile at the Rod El Farug Waterworks located on the east bank of the river, north of Cairo. Treated by sedimentation (settling and clarification), filtration (rapid gravity) and chlorination (chloronome). Storage at waterworks (filtered) totals 3·3 million gallons. There are two balancing reservoirs in the El Muqattam Hills, one of 11 million gallons, the other of unknown capacity.
			(*b*) Boreholes	9,200,000	Total not known (see remarks)	Fully treated (see remarks)	1954	(*b*) *Supply to Heliopolis, Helmieh and Qubba Suburbs.* Supplies extracted from boreholes at the El Zeitun Waterworks are filtered and chlorinated. There are separate mains systems serving:— (i) Heliopolis area via a small reservoir near Almaza

								(ii) Helmieh and Qubba; balancing tank of 700,000 gallons capacity at the north-east corner of Heliopolis Racecourse
			(*c*) Nile	Not known (adequate)	Total not known (see remarks)	Fully treated	1954	(*c*) *Supply to Gezira, Giza, Imbaba and villages on the west bank of the Nile.* Water drawn from the Nile at Giza Waterworks; treated by sedimentation (settling and clarification), filtration and chlorination. Balancing reservoir of 220,000 gallons capacity at Imbaba
			(*d*) Nile	Not known (adequate)	Total not known (see remarks)	Fully treated (see remarks)	1954	(*d*) *Supply to Ma'adi.* Water drawn from the Nile at Ma'adi Waterworks and treated by sedimentation, filtration and chlorination. Elevated tank of 165,000 gallons capacity at waterworks
			(*e*) Nile	Not known (adequate 880,000 in 1953 but must have been increased substantially)	Not known	Believed to be fully treated	1954	(*e*) *Supply to Helwan.* Water drawn direct from the Nile at Helwan Waterworks
			(*f*) Nile	24 million	Not known	Fully treated	1962	(*f*) *Supplies to South Cairo.* Extensions to existing sources of supply, details not yet available. First delivery of Czech-manufactured pumping and purification plant made in June 1962. *General Note* (i) All waterworks and pumping stations equipped with a mixture of electric and diesel-driven plant (ii) Although the information given above is believed to be substantially correct, there have probably been improvements in capacities and new plant has no doubt been added since the dates stated
7	31° 02′ N., 30° 28′ E.	Damanhur	Canal off Nile	1,700,000	Not known	Filtration and chlorination	1954	

Serial	Co-ordinates	Place	Source of Supply	Capacity (gallons per day)	Storage (gallons)	Treatment	Date of Information	Remarks
8	31° 25′ N., 30° 48′ E.	Damietta	Nile	1,100,000	Not known	Not known (probably filtration and chlorination)	1954	
9	29° 19′ N., 30° 50′ E.	El Faiyum	Canal off Nile	1 million (approx.)	Total not known (see remarks)	Filtration and chlorination	1954–61	Waterworks, located 600 yds east of town, is equipped with electrically driven centrifugal pumps. Filtered water elevated tank at waterworks, capacity—160,000 gallons. Distribution is by gravity. System was being improved in 1961
10	31° 03′ N., 31° 23′ E.	El Mansura	Mansuqiya Canal	3,300,000	Not known	Filtration (probably chlorinated also)	1954	Canal draws off the Damietta Nile, waterworks located ¾ mile from the junction with the river. Electrically driven plant at waterworks
11	28° 06′ N., 30° 45′ E.	El Minya	Nile	768,000	155,000	Not known (probably filtration and chlorination)	1954	Waterworks at north end of the town
12	25° 41′ N., 32° 39′ E.	Luxor	Nile	250,000	Not known (at least 66,000)	Filtration and chlorination	1954	Electrically driven plant in waterworks
13	30° 58′ N., 31° 10′ E.	Mahalla El Kubra	Branch Canal off Nile Boreholes	775,000	1,100,000	Flocculation and sedimentation, filtration and chlorination. Borehole supplies only are softened	1954–59	Capacity has probably been substantially increased. Borehole sources used only when the Nile is low
14	31° 21′ N., 27° 14′ E.	Matruh	Galleries (adits)	90,000	Not known	Probably none	1954	Water is pumped from horizontal galleries in the limestone to a rising main. Yield is dependent on rainfall. Brackish supplies are provided by wells

			Western Desert Pipeline	See remarks	See remarks	See remarks		Matruh was connected to the Western Desert Pipeline, but it is not known if this is currently operating. See Appendix C, Serial 2
15	30° 43′ N., 31° 16′ E.	Mit Ghamr and Zifta	Damietta Nile	110,000	Not known	Filtration and chlorination	1954	Improvements in hand in 1961
16	26° 10′ N., 32° 43′ E.	Qena	Nile	1,100,000	Not known	See remarks	1954–61	Water treatment plant under construction 1961
17	31° 24′ N., 30° 25′ E.	Rosetta	Rosetta Nile	600,000	Not known	Not known (probably filtration and chlorination)	1954	Waterworks 5 miles south of town
18	30° 33′ N., 31° 01′ E.	Shibin El Kom	Branch Canal off Nile Boreholes	250,000	66,000	Sedimentation, filtration and chlorination	1954	Waterworks are 400 yds south of town; electrically driven plant. Boreholes supplement supplies when Nile is low
19	26° 33′ N., 31° 42′ E.	Sohag	Nile	1,100,000	Not known	Not known (probably filtration and chlorination)	1954	
20	30° 50′ N., 31° 00′ E.	Tanta	Branch Canal off Nile Boreholes	Not known (adequate)	Not known (but existing)	Filtration (and probably chlorination)	1954	Borehole supplies used only when the Nile is low. Rapid gravity filtration units
21	30° 35′ N., 31° 31′ E.	Zagazig	Muweis Canal	3,300,000	Not known	Filtration and chlorination	1954	
	Part II. Suez Canal	*Area*						
22	30° 36′ N., 32° 18′ E.	Port Said Port Fouad	Ismailia/ Sweetwater Canal—Northern Branch	14,300,000 (see remarks)	Exact figure not known, not less than 2 million including storage at waterworks	Filtration and chlorination	1953–62	Waterworks operated by Suez Canal Authority is located at Raswa, 2 miles south of Port Said. Raw water is drawn from the canal by electrically operated pumps, filtered by a mixture of slow sand and rapid gravity filters, chlorinated and pumped to the mains by electrically-driven pumps. There are direct-driven standby generating sets. Capacity is currently being increased to 22 million gallons per day by the installation of additional treatment plant

Serial	Co-ordinates	Place	Source of Supply	Capacity (gallons per day)	Storage (gallons)	Treatment	Date of Information	Remarks
23	30° 52′ N., 32° 19′ E.	El Qantara	Ismailia/ Sweetwater Canal—Northern Branch	See remarks	See remarks	Filtration and chlorination	1953	(*a*) *Raw Water.* All raw water is pumped from the Sweetwater Canal (*b*) *Raw Water Pumping Plants.* All locations on west side of Suez Canal:— (i) ex-Palestine Railway plant—capacity not known (ii) ex-W.D. plant—capacity 25,000 gallons per hour (iii) Suez Canal Authority plant—capacity not known (*c*) *Filtration and Purification Plant* (i) ex-Palestine Railway plant—capacity 500,000 gallons per day, located on the west side of Suez Canal (ii) ex-W.D. plant—capacity 600,000 gallons per day, located on east side of Suez Canal (iii) Suez Canal Authority Supply—raw water only (*d*) *Storage.* The ex-Palestine Railway's supply had 730,000 gallons underground storage (treated water) on the east side of Suez Canal. Storage in the ex-W.D. system is not known but there were 3 × 10,000 and 1 × 25,000 gallons elevated tanks in 1946 (*e*) *Pipelines.* There were two raw water pipelines (one disused and probably unserviceable) and one filtered water pipeline under the Suez Canal in 1953

24	30° 35′ N., 32° 16′ E.	Ismailia (*a*) Town supply	Ismailia Canal	3,960,000 (see remarks)	2,500,000 (approx.)	Filtration and chlorination	1952–62	Operated by the Suez Canal Authority. Raw water is taken by gravity from the canal, treated and pumped into the town mains. Balancing reservoir in the system is believed to be of 230,000 gallons capacity; otherwise there is little storage. Works on additional treatment plant to raise the capacity of the system to 6·6 million gallons per day were nearly completed in 1962
		(*b*) Ex-W.D. system	Ismailia Canal	See remarks		Filtration and chlorination		The Ismailia/Abu Suweir/El Kirsh/Moascar/Gebel Maryam W.D. complex was served by its own water supply systems supplemented from the Ismailia town supplies. It is not known how many of the ex-W.D. systems are still functioning but details (1954) are as follows:— (*a*) All raw water drawn from the Ismailia/Sweetwater Canal (*b*) *Filtration and Purification Plants:—* (i) Moascar North — capacity 600,000 gallons per day (ii) Moascar (ex-RAF) — capacity not known (iii) Ismailia East — capacity 600,000 gallons per day (iv) Nefisha — capacity 355,000 gallons per day (v) Gebel Maryam — capacity 40,000 gallons per day (*c*) *Storage and Distribution*. There were a number of storage and service reservoirs and a mains system, varying from 8 to 3 ins diameter, serving the area (*d*) *Ferry Post, Ismailia, East Bank Suez Canal Supplies*. In 1946 a syphon fed 600,000 gallons per day under the Suez Canal to a filtration plant on the east bank. Storage capacity was 29,700 gallons. It is not known if this installation still exists

Serial	Co-ordinates	Place	Source of Supply	Capacity (gallons per day)	Storage (gallons)	Treatment	Date of Information	Remarks
25	29° 58′ N., 32° 33′ E.	Suez	Ismailia/ Sweetwater Canal—Southern Branch	6,600,000 (see remarks)	Not known but probably adequate	Filtration and chlorination	1953–62	Operated by the Suez Canal Authority. Waterworks are located about two miles north of the town. Raw water is drawn from the canal, treated and pumped into the town mains system. This system and its associated storage and service reservoirs covers the town and port areas of Suez, Port Ibrahim and Port Taufiq. Work was proceeding on additional treatment plant to raise capacity to 9·2 million gallons per day in 1962 *Suez ex-W.D. System.* Much of the ex-W.D. system has probably been incorporated in the town supplies. Raw water was drawn off the canal at waterworks in the vicinity of the town installation, treated and pumped into the W.D. mains. The W.D. system also served military installations and camps north-west and north-east of Suez
26	See remarks	Suez Canal Area. Other supplies	See remarks	See remarks	See remarks	See remarks	1953	Apart from the water supply systems of main locations given in Serials 21–24, above, there were former W.D. installations, incorporating filtration and purification plant as follows:— (*a*) *Waterworks taking off the Ismailia/Sweetwater Canal* 30° 25′ N., 32° 18′ E. Abu Sultan 30° 24′ N., 32° 21′ E. Deversoir 30° 17′ N., 32° 21′ E. Fanara 30° 15′ N., 32° 30′ E. El Kabrit 30° 12′ N., 32° 25′ E. Gneifa 30° 46′ N., 32° 19′ E. El Ballah 30° 20′ N., 32° 18′ E. Fayid 30° 10′ N., 32° 31′ E. Shandur (*b*) *Boreholes* 30° 33′ N., 31° 47′ E. Tel El Kebir 30° 34′ N., 31° 50′ E. Qassasin

	Part III. Gaza Strip	*Area*						
27	31° 30′ N., 34° 28′ E.	Gaza	Wells Boreholes	1,500,000	610,000	Not known	1957	Electrically and diesel-driven pumps. There are also a number of private wells; ex-W.D. boreholes in the area may still be in use. Over-pumping causes salinity in yields
28	31° 08′ N., 33° 48′ E.	El Arish	Wells Boreholes	800,000	23,000	Not known (probably none)	1949	Electrically and diesel-driven pumps. There are also a number of private wells yielding poor supplies
29	31° 22′ N., 34° 16′ E.	Khan Yunis	Wells	60,000	Not known	Not known	1941	
30	31° 17′ N., 34° 14′ E.	Rafah	Wells Boreholes	900,000	Not known	Not known	1949	

PRINCIPAL ELECTRIC POWER STATIONS OF THE NILE DELTA

Serial No.	Power Station	Installed Capacity (megawatts)	Generators × Ratings (megawatts)	Generating Voltage (kilovolts)/ Frequency(c.p.s.)	Boilers × Ratings (tons/hour)	Steam Pressure (lb/sq. in.)	Steam Temperature (degrees C.)	Year Built	Contractor	Remarks
	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)	(*g*)	(*h*)	(*j*)	(*k*)
	Cairo Area									
1	Saptieh	50	9 between 3·8 and 12	10·5/40 and 50	8 between 5 and 30	206	370	1920	Not known	
2	Shoubra	48	4 × 15; 1 × 6	10·5/50	1 × 12; 1 × 18; 3 × 25; 1 × 30	Mainly 498	Mainly 425	1933–38	A.C.E.C.; BBC	This station does not feed into the 63 kilovolt Cairo ring
3	Cairo North	111	2 × 10·5; 1 × 11·5; 1 × 20; 2 × 30	10·5/50	6 × 60; 1 × 75; 3 × 85	6 × 569; 4 × 910	6 × 425; 4 × 490	1953–54	Alsthom SSW	
4	Cairo South	135	2 × 60; 2 × 7·5	10·5 and 6·3/50	4 × 175	996	495	1957–58	SSW AEG Steinmuller	To be expanded by 120,000 kilowatts—English Electric Company
5	El Tabbin	45	3 × 15	10·5/50	3 × 50[1]	498	435	1958[2]	Technoexport (Hungary)	[1]Boilers can be heated by fuel oil and by blast furnace gas from Helwan Steelworks [2]Began operating

	Alexandria Area									
6	Karmouz	85	4 × 16; 1 × 10; 1 × 4·7; 1 × 4·1; 1 × 2·2	10·5 and 2·15/50	6 between 5 and 17; 8 between 40 and 65	6 × 199; 8 × 569	6 × 230; 8 × 400	1921–26; 1946–57	Oerlikon	
7	Siouf	50	2 × 25	Not known/50	2 × 115	1,038	525	1958[1]	SSW	[1]Began operating. Expansion by 26,000 kilowatts projected
	Remainder of Nile Delta Area									
8	Talkla	37·5	3 × 12·5	Not known/50	6 × 40	569	430	1953	Westinghouse Babcock Wilcox USA	To be expanded by Czech company
9	El Alf	13	3 × 2·5; 1 × 5	Not known/50				1930	Metropolitan Vickers, AEG	
10	Damanhour	45[2]	3 × 15	6·6/50	3 × 65	596	450	1959[1]	VEB EKE Berlin DDR	[1]Two additional 65 megawatt sets ordered from West German Consortium, which includes AEG, July 1963. Work to be completed by 1965 [2]Began operating
11	Bilquas	5	4 × 0·88; 1 × 1·5					1936	Sulzer MAN.	Diesel station

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BRITISH INTELLIGENCE SURVEY

EGYPT

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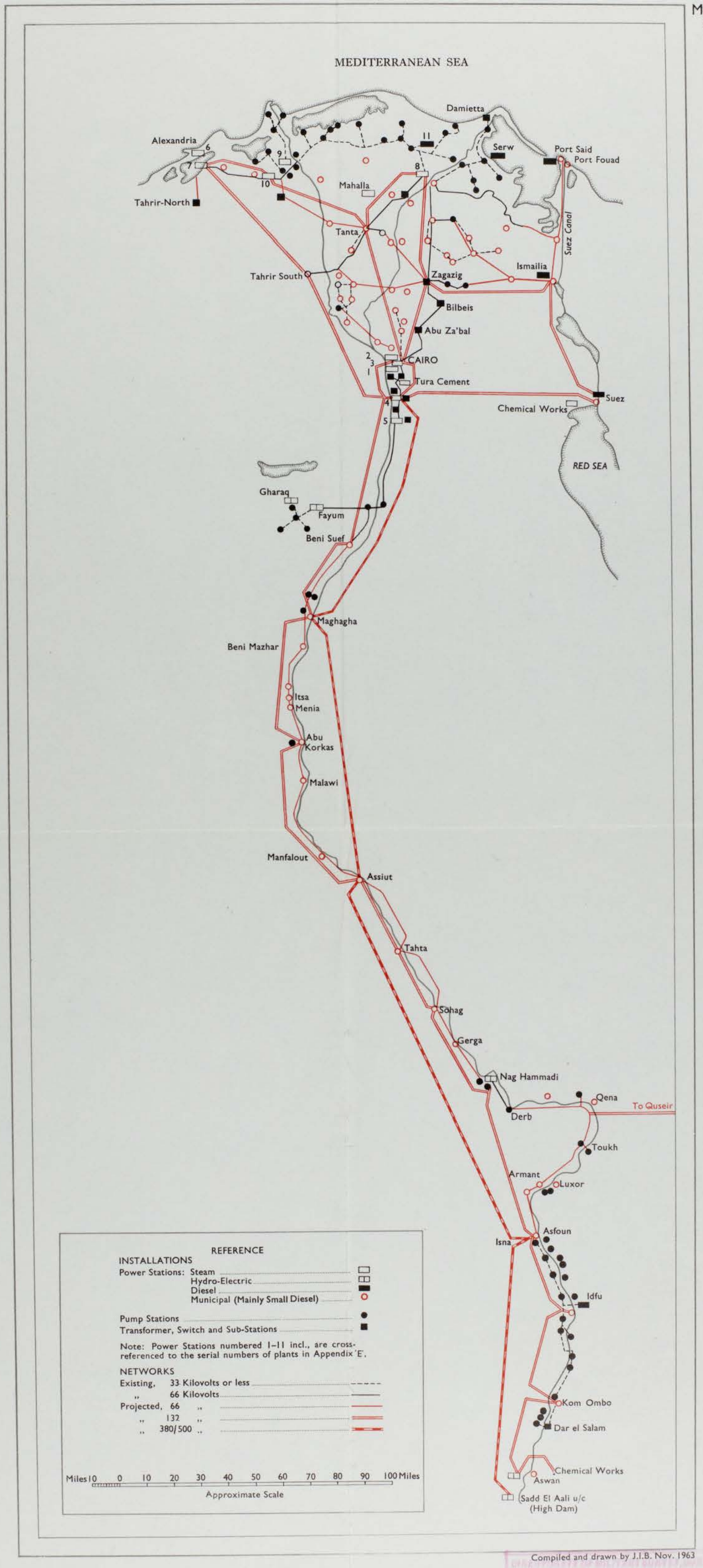
EGYPT
EXISTING ELECTRICITY INSTALLATIONS AND EXISTING AND PROJECTED NETWORKS

MAP C



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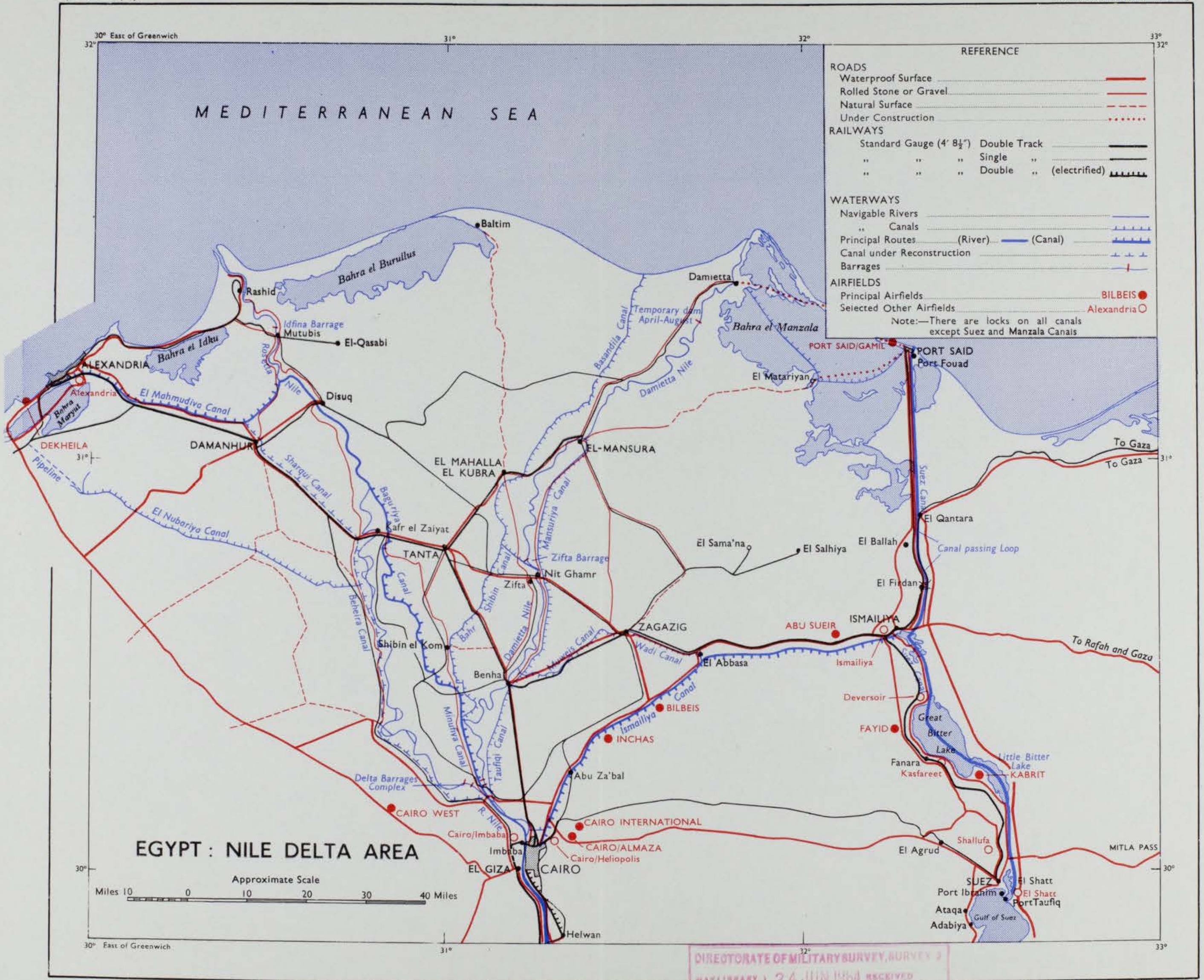

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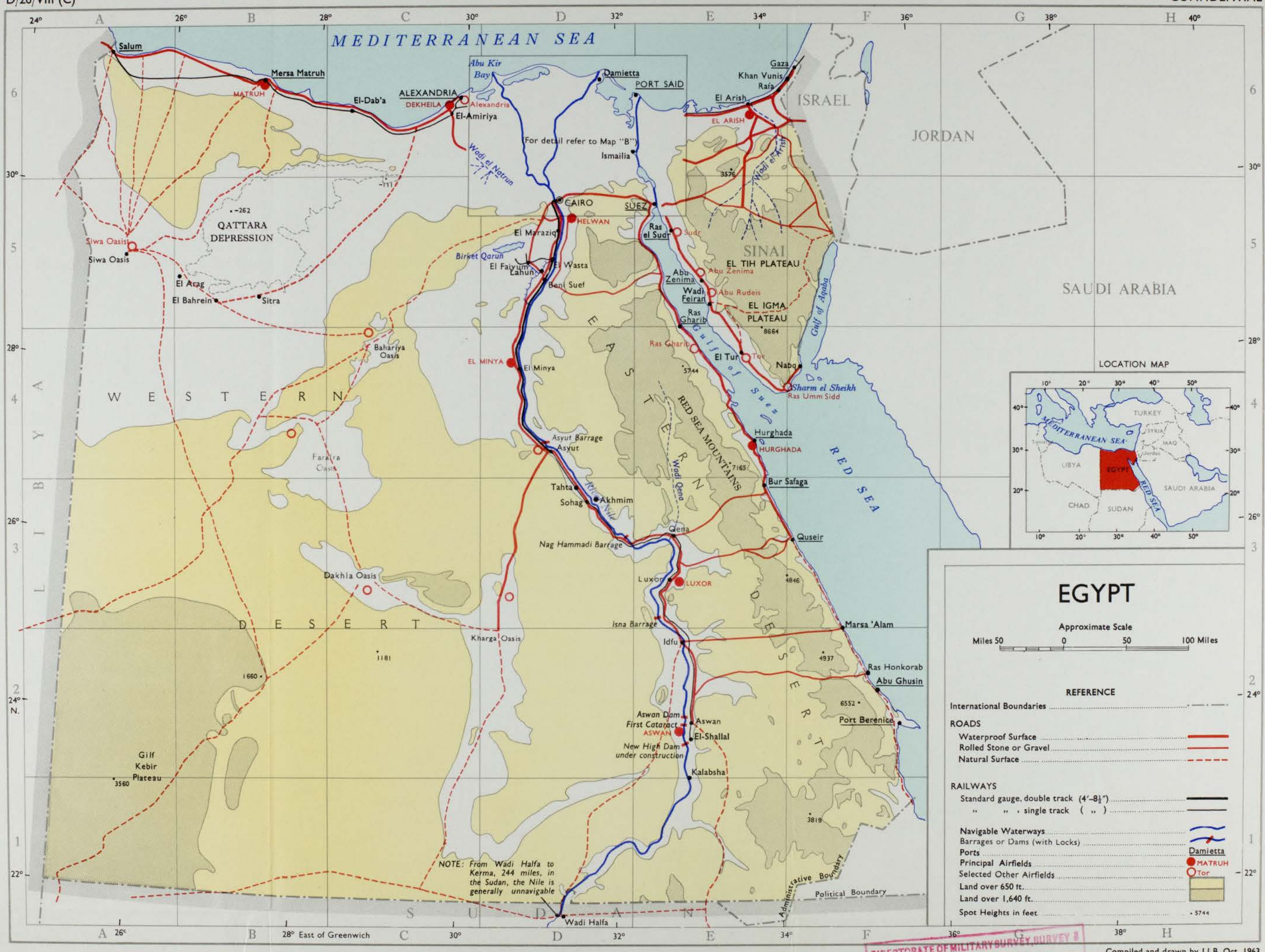

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